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THE GOLD COAST: SOME CONSIDERATIONS OF ITS STRUCTURE, PEOPLE, AND NATURAL HISTORY.

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THE Gold Coast comprises the Gold Coast Colony on the south, with the whole of the coast-line, an area of 23,200 square miles, and a population of 853,700, or 36 to the square mile; Ashanti in the middle, area 20,000 square miles, population 287,800 (14 to the square mile); and the Protectorate of the Northern Territories in the north, area 35,800 square miles, population 361,800 (10 to the square mile). The total population, which is probably underestimated, is given as 1,503,300 (19 to the square mile). Of this number about 1500 are Europeans. Its geographical position can be seen by reference to the accompanying map. The capital, Accra, stands on the coast in the eastern portion of the colony.

Under the able and progressive administration of Sir Hugh Clifford, K.C.M.G., the country is making a rapid advance in every way. Railways are being steadily extended into the rich agricultural districts, and are bringing quickly to the ports, Accra and Sekondi, their rich products, especially of cocoa beans. This cocoa-growing industry has increased nearly tenfold in the last ten years. In annual value of exports it now takes first place, having superseded gold. It is still rapidly expanding, and if the native farmer can be induced to realize the necessity for destroying the many noxious pests infesting the cocoa trees, and act accordingly, there is practically no limit to the expansion of the industry.

The seasons may be broadly divided into a wet season, ranging in different parts from April to August, and a dry one from November to March. The wet season is preceded by a tornado season of a month to two months, and has a variable break of a month to six weeks in July and August, which is followed by a rainy September and October.

The annual rainfall varies from 30 to 60 inches in the Northern Territories and northern Ashanti to between 40 and 90 inches over the greater portion of the forest country and the coast west of Appam, but in the Accra district and to the east it is between 25 and 40 inches.

The mean temperature varies considerably in different parts of the country, and may be taken as between 75° and 84° Fahr. The relative humidity is high. On the coast and in the forest belt it may be taken as between 72° and 93°, excepting Sekondi, which is below 60°, but in northern Ashanti and the Northern Territories it varies from 55° to 70°.

The prevailing wind on the coast is from the south-west. A strong dry cool wind, called the harmattan, blows from the north during part of December and the whole of January and February. It is felt much stronger in the Northern Territories and the open parts of Ashanti, Kwahu and Akwapim than on the coast, though on those parts of the coast where no wide forest belt acts as a shield it is quite appreciable. During the harmattan the temperature sometimes falls to below 55° Fahr. at night in some places. Warm clothing is necessary during this period.

Geographically, the country may be divided into five parts, viz.—

1. The coastal swampy region of Apollonia on the west, and Adda and Kwitta on the east, and the open coastal plains of Accra and Eastern Akwapim in the east.

2. The highly dissected plain of Denkyira, Wassaw, Akim, and southern Ashanti.

3. The highlands of northern and central Ashanti, Kwahu, and Akwapim.

4. The interior plains of the middle-Volta, Puru, Bere Su, Obosum and Afram Rivers.

5. The plateau of the Wala, Grunshi and Mamprusi regions of the Northern Territories.

1. The coast-line varies very much in its character from west to east. Between Newtown and Axim there are strips of beach sand, backed by swampy country, extending in places to about 20 miles from the coast. From Axim eastward to beyond Appam, the greater portion of the coast-line consists of massive rocky cliffs, some of them rising as sheer walls to upwards of 200 feet above sea-level. Where streams reach the ocean there are usually brackish or freshwater swamps or lagoons, separated from the sea by fringes of sea sand. From near Appam eastward to the limit of the colony there is an alternation of lagoon and coastal plain, with or without cliffs. The land is steadily encroaching on the sea. The coast-line is undoubtedly rising, a fact evidenced by the occurrence of several well-marked marine terraces or platforms, one of which is from 70 to 100 feet above present sea-level, and at least two others of more recent age, of 20 feet and 8 to 10 feet above it. Three distinct marine terraces are visible in the Winneba district. The last uplift of 8 feet was partly the cause of the occurrence of the fringing and landlocked lagoons to be seen now along many parts of the coast. In some places shells of existing marine species can be seen in the clay and mud of the banks of channels several feet above present sea-level. Owing to the uplift the shallow

estuaries in indentations of the coast at the mouths of streams were converted into lagoons. The strong west-south-west Guinea current and the prevailing south-west wind acting on the sea formed a great swell which persistently swept and is still sweeping along the coast, transporting landward large quantities of sand along the sea-floor. Continued action of this kind has resulted in the formation first of a shoal, then of a tidal sandbank, and finally of a shore-sand barrier. This work is being actively aided and hastened by the wind, which blows the dry sand inland. The constructive action of the two forces proceeds rapidly, and at such places the land is gaining at the expense of the sea; while at others, as at Accra, those portions of the cliffs that are composed of soft rocks are being rapidly broken down and the material washed away. Shore-sand barriers in most places prevent the waters of the impounded streams from flowing into the sea. In a few places, however, the streams are able to discharge during the rainy season floods, or at low tide, while several of the small streams and the large rivers have permanent outflows.

The occurrence of earthquakes is evidence that the coast is not yet in a state of stable equilibrium. Small shocks, recorded by a seismometer at Accra, are by no means uncommon. Severe earthquakes have been experienced at various times during the last four centuries. In 1636 the Axim district was badly shaken. Mine workings and buildings collapsed, and the walls of Fort San Antonio at Axim were cracked. In 1858, 1862, 1863, 1883, and 1906 strong shocks took place. That of 1862 almost destroyed the forts at Accra. The coast-line there shows numerous faults in the cliffs where great blocks of strata were displaced in the remote past, while in the country behind Accra and Christiansborg other faults are visible. The general character of almost the whole of the coast-line clearly points to much greater dislocation of land-masses in the past than any that has happened in historic times.

This coastal region is the home of the fisherman of the sea and the lagoon, the workers among shipping and in the trading stores, and a large proportion of the educated natives and artisans.

The great drawback to this surf-beaten coast is the absence of any harbour protected from the heavy swell from the Atlantic and the strong Guinea current. All shipping, therefore, has to anchor in open roadsteads at varying distances of from 1 to 3 miles from the shore. Communication with the land is made with surf-boats manned by native paddlers and steered by a native standing at the stern. Remarkably capable they are in handling their boats, watching their opportunity to cross the bar on the crest of a suitable roller and grounding as near to the shore sand as possible. The villages on the coast are almost exclusively fishing ones. Few of them grow any vegetable food for themselves, but depend upon what is obtainable from the farms inland. The fish are dried either on the ground in the sun or on wooden frames over mud-walled furnaces. From the nature of their industry all these villages are strongly malodorous.

2. The intermediate region consists in the main of a dissected plain rising northward from the coast to a height of about 900 feet above sea-level. It ranges imperceptibly into the highlands of division 3. On it there stand numerous fairly steep hills and ridges and several ranges, such as the Moinsi Hills in southern Ashanti and the Atiawa Range in Akim, remnants of once-connected land masses of probably two or more distinct plains. Whether these were marine plains or peneplains is a question still unsettled owing to the want of sufficient evidence.

This geographical division embraces the main thick forest belt of the country. It is the principal farming and cocoa-bean-growing country, and furnishes most of the wild rubber, kola nuts, and mahogany of the colony. Narrow bush tracks connect the villages, which trade with one another in groups. The villages of each group have the local market in turn, while in some of the larger ones there is a daily market also. The mahogany logs are cut in the forest and dragged by teams of labourers over rollers of wood to the railway, or to streams down which they are floated in the rainy season to the sea. There they frequently get beyond control during shipping operations in heavy weather, and drifting away are thrown on the sandy beaches or rocky platforms, where they finally become covered with sand or are wave-worn and smashed on the rocks. Hundreds of these logs strew the coast east of the mouth of the Ankobra river and Sekondi. In other localities scores of them lie on the strips of sand between the lagoons and the sea. They have been floated down small rivers during floods into these lagoons, and failing to be taken out to sea and shipped before the subsidence of the flood-waters have become stranded and imprisoned through the formation of sand-barriers across the lagoon entrances. The forest is of two kinds. One may be called the original forest of high well-grown timber with little undergrowth as a rule; the other is the renewed forest with a few big old trees, many young ones, much tangled undergrowth, and many noxious weeds and grass. This is the type of forest that grows on country that has been farmed and then temporarily abandoned for a period.

The present river system of these two geographical divisions is of comparatively recent age. The main courses of all the streams are in shallow valleys, or rather channels, though most of them have grades high enough to admit of rapid corrasion. The largest rivers, the Volta, Pra, and Tano, have low falls and rapids near the coast; they approximate to the heights of the latest uplifts of the land.

The prevailing colour of the soil is red, of various shades, over most of the country whether derived from crystalline, metamorphic, or sedimentary rocks. This is apparently owing to the oxidation of iron which is widely distributed in small or fair quantities through all these rocks. The more recently raised portion of the coast-line consists of pale grey sands with humus, while the lagoon deposits are dark blue to black mud.

In the forest belt the thick vegetation prevents the washing away of the

COASTAL CLIFFS, AMOA POINT, BUTRE RIVER, GOLD COAST COLONY

MOAT AND DRAWBRIDGE, FORT ST. GEORGE

on raised marine plain, Elmina, Gold Coast Colony

SUB-AËRIAL EROSION OF JOINTED SANDSTONES, JEMMA, ASHANTI

VOLTA RIVER AT YEJI, NORTHERN TERRITORIES, IN DRY SEASON

soil as it forms from the decay and disintegration of the underlying rocks. Thus is formed a thick cap of soil, ranging in some places to 30 feet in thickness. In other places, under certain conditions, this soil becomes cemented by iron oxide into a firm rock, broadly called "laterite," which occurs on the tops of flat ridges or irregularly upon flat expanses at high or low levels.

3. The highlands of north-western Ashanti are separated from the intermediate region by no sharply defined boundary, but in northern Ashanti, Kwahu, and Akwapim this boundary is sharp and clear, consisting in most parts of scarps or steep slopes rising 600 to 1000 feet above the country to the south.

The Akwapim highlands consist of a prominent range of hills commencing near the coast north of Accra and extending north-east for 50 miles to the Volta River. Beyond the river the highlands continue as much-dissected parallel ridges and finally pass into Togoland. This range has steep sides and a steep termination at the south. It varies in height from some 1400 feet near Aburi to upwards of 1600 feet further to the north. Covered with a thick forest, numerous towns, and cocoa-bean farms it affords a strong contrast to the sparsely populated, open grassy and lightly timbered Krobo and Shai plains to the east and south-east, on which stand the Shai Hills, and Krobo, Yungwase, and other isolated mountains rising to heights of 700 to 1200 feet above sea-level.

The Akwapim Range owes its orientation to its geological structure, for it consists of folded schists, quartzites, phyllites, and sandstones, striking generally north-east to south-west. It is deeply dissected along the strike of these rocks, where several streams have eroded deep valleys with parallel ridges, and across the strike, where small streams have cut deep valleys even through quartzites and quartz-schists. At its northern end, where it meets the Akwamu Range, the Volta has cut a deep valley obliquely across the strike of the strata and given to the country some beautiful scenery. Bare or wooded cliffs, 100 to 300 feet high, rise sheer from the river, or less steeply from the older terrace of the stream, with its pretty rocks, islets, and islands. Though sluggish, deep, and some 200 to 300 yards wide where it cuts through the steep part of the range, the river below there widens to 2 miles and flows tumultuously for more than a mile in a series of parallel north-west to south-east channels between numerous wooded rocky islands, forming the Senchi rapids. After this its course is generally with the strike of the rocks for some 4 miles, till near Kpong it again widens to about 2 miles and rushes through numerous channels oriented like those of Senchi before resuming its south-easterly course. These Kpong and Senchi rapids are a serious obstacle to the navigation of the river, for none but native canoes can ascend the river in the dry season, while in the rains even a powerful launch would progress but slowly against the current of some 8 to 12 miles an hour.

Trending north-west for some 120 miles from Akwapim through Kwahu

and north-central Ashanti to the Mampong district, 30 miles north of Coomassie, there is a ridge varying from 1500 to 2400 feet above sea-level. In parts on its south-western side, notably on the edge of the Kwahu Plateau, this ridge presents to the undulating country below a sharp scarp up to 700 feet in height. In other parts it has the appearance of an ordinary ridge rising steadily from the low country. Northwards these highlands slope down to the interior plains. In several places they are deeply cut by streams flowing to the north and to the south. In other places they show well-marked niches crossing them at high levels and at right angles or nearly so. These are dry valleys of an earlier geographical epoch, and they occur at altitudes of 400 to 600 feet above the country to the south. Parts of the Kwahu Plateau are grassy and lightly timbered, but the rest and the main mass of these highlands are covered with thick forest containing rubber, kola nut, mahogany, odum, and other valuable trees.

In north-western Ashanti the country to the north rises steadily to Kintampo, 1200 feet above sea-level, but thence northward falls steeply to the Black Volta Valley. In north-central Ashanti it falls steadily northward from some 1800 feet near Insuta and Mampong to below 1000 feet at the Afram River. The Kwahu Plateau, over 2000 feet high, deeply dissected by several streams, has a width north to south of some 15 miles from Obo to beyond Abetife. Thence northward it slopes down to the Afram plains. On the plateau are numbers of high points rising to 2400 feet above sea-level.

4. The interior plains comprise the basins of the lower Black Volta, White Volta, Puru, Bere Su, Obosum, and Afram, where, instead of the drainage being southward direct to the coast, it is eastward and south-eastward in the main to the Volta River, thence southward to the coast. The Black Volta, rising in French Senegal and Niger Province, flows southward to about 20 miles west-north-west from Kintampo, where it takes a sharp turn to the east; thence round by north its course is easterly to its junction with the White Volta flowing south-easterly; thence in the latter direction to beyond the junction of the Daka on the Togoland border. This remarkable bend in the Black Volta is a striking feature of the country, and sufficient evidence has not yet been obtained to account for it. There are strong grounds for regarding that river as having formerly extended its southerly course down a valley, portion of which is now that of the Tano River, and as having changed its course owing to general uplift of the region to the south and to warping of that in northern Ashanti. No evidence of block-faulting in the latter region has been found.

This old valley is a broad one, and though much dissected by the streams of the present system, its general course southward can be seen from odd points where the absence of thick vegetation admits of a view of the country. On the Bole–Kintampo road, 4 miles south of the Black Volta River, at altitudes of from 200 to 350 feet above the river, there

occur deposits of river pebbles similar to those of the present stream. Sixty miles to the north-east of this place, to the north of the river, similar river pebbles cap a high ridge upwards of 600 feet above that stream.

The general character of the country is that of a well-grassed open forest of low trees with patches of high grass, and of wide expanses of grass almost or wholly devoid of small scraggy trees. During the dry season following the rains, when the grass has grown to upwards of 10 feet in height in places and has shed its seed, the natives cut as much of it near their villages as they need for renewing the thatch of their houses. Then the rest is burnt to clear the ground for new farms and the various paths through the country, and to enable the hunters to follow big game. At this time of the year (December to February) the atmosphere, laden with the smoke of bush fires and the dust of the harmattan, effectually prevents any clear views from being obtainable. Many parts of the country are blackened wastes, in which not a sign of green is visible; nothing but scorched scraggy timber and bare soil are to be seen. In other places the leaves of the trees have been burnt or are dry and shrivelled, and the whole country appears a lifeless waste. But with the approach of the tornado season the latent life of the vegetation reveals itself; green leaf-buds slowly appear among the browned and blackened twigs and branches, the trees burst into green, and there is a glorious transformation when the blessed rain washes the trees, drenches the ground, and calls forth from its bosom the new carpet of green.

This seasonal burning of the country has its advantages and its drawbacks. Without burning the grass progress through the country in many places would be extremely slow and laborious, and travel would need to be confined to overgrown native paths or the tracks of large game. Farm lands could not be so easily worked, and myriads of insects would escape destruction. But, on the other hand, vast numbers of young trees are destroyed, and none but the hardiest as a rule survive the fiery ordeal. Here and there patches of the open forest country that have escaped burning through fortuitous circumstances show by their well-grown straight saplings and fresh shrubs a marked contrast to the fire-swept areas in their vicinity.

During the dry season the rivers become very low, and only the larger ones continue to flow. In the rainy season the rivers rise from 20 to 40 feet, and in many places overflow their banks and spread over miles of the adjacent country. Then, as the dry season approaches, they fall rapidly and become confined again to their deep channels. This is the time when the main harvest of fish is gathered by the fishermen of the Adda district at the mouth of the Volta. These men come up the river in their canoes for distances of from 150 to 500 miles, and catch the fish passing along the shrinking channels from the swamps and lagoons as the flood-waters rapidly subside. Then later they build temporary villages on the sandbanks in the river or on its banks, and catch the fish with cast-nets

from canoes. The fish are sun- or smoke-dried, and sold to the local people or to traders from Coomassie.

5. The Wala–Grunshi–Mamprusi plateau, the northernmost portion of the Northern Territories, has a steady fall to the south. It has several large streams, the Black Volta, Mambili, Kulpawn, Sissili and White Volta, which flow generally southward through it in narrow valleys carved out of broad valleys of an earlier geographical epoch. Where cutting through a series of flat-bedded shales and sandstones these old valleys have well-defined scarps, though not as high as those in Kwahu.

When travelling from Tamale to Wa two prominent scarps are descended at Bungweli and at Konkori. The Konkori scarp, some 500 feet higher than the valley at its foot, has three distinct platforms, evidently the remains of river terraces. From various points on this route portions of other scarps are visible, all seemingly trending generally north to south. It is practically certain that the wide valleys below these scarps have been cut by large streams which no longer flow through them. The amount and character of the erosion that has taken place cannot be reasonably attributed to the small streams now flowing, during the wet season only, through them. It seems probable that the Kulpawn River once continued its general southerly course to the Black Volta, and that land movements have been the cause of its marked easterly change of course to the White Volta River above Daboiya.

All this country is simply lovely during the tornado season. Many parts of it have the appearance of well-tended parks, with shea-nut, dawa dawa, and other pretty trees gracing the landscape. But in the dry season much of it is a dreary burnt wilderness.

A very brief outline of its geology may be given. Among the oldest rocks so far known in the country are series of highly or moderately altered sediments (mica-schists, quartz-schists, quartzites, phyllites, slates, marble, limestone, sandstones, grits, breccias, and conglomerates) that occupy the middle and western portion of the colony and Ashanti and occur on the western side of the Northern Territories. From the coast they extend generally in a north-easterly direction inland from east of Accra to the mouth of the Ankobra River, west of Axim. They form the Akwapim, Atiawa, and Moinsi ranges and the hills of the western frontier, besides numerous ridges and hills in the intermediate geographical zone (2). These rocks strike generally north-east to south-west. They are widely folded in parts, but intensely folded and to a less extent much contorted along numerous and well-defined zones parallel with their strike.

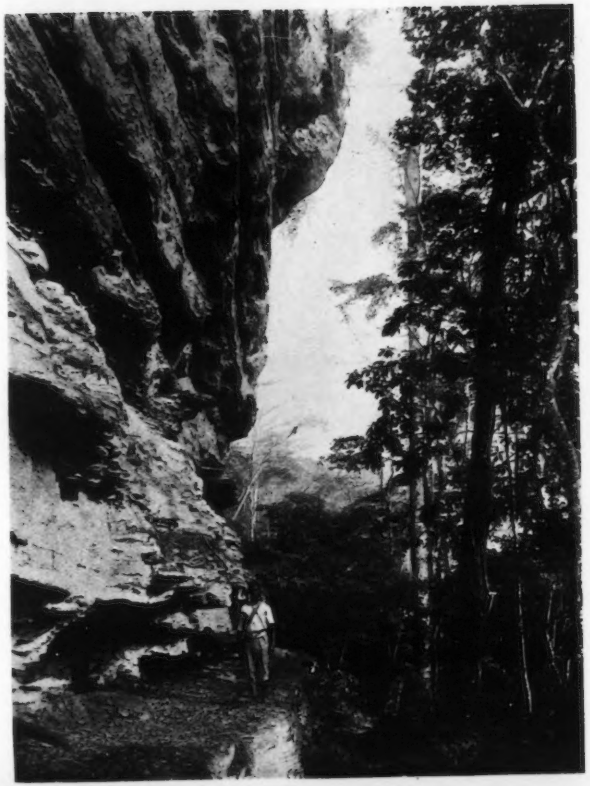
In the eastern portion of the colony on the Krobo and Shai Plains, extending back from the coast from near Accra to beyond Prampram, is a great mass of gneisses, amphibolites, sheared pegmatites, etc., having the same general strike as that of the altered sediments. Their exact relation to these sediments has not yet been proved, but undoubtedly large

APPAM, GOLD COAST COLONY

Old estuary beheaded by latest uplift of coast

TOP OF SCARP (MIDDLE PORTION), KONKORI, NORTHERN TERRITORIES

BLACK VOLTA RIVER NEAR BONVALIPE, NORTHERN TERRITORIES, IN DRY SEASON



KWAHU SCARP (UPPER PORTION), OBO, GOLD COAST COLONY

PARTY OF TRADERS IN FOREST, CHICHIWERE, ASHANTI

parts of them are completely altered sediments which have undergone greater metamorphism than those specified. All of these rocks probably belong to periods ranging from early Palæozoic to Pre-Cambrian. Through these altered rocks are numerous intrusions of granite and diorite, porphyry, pegmatite, and other allied rocks throughout the country. In some places these intrusive rocks have shared in the great dynamic changes undergone by those they have intruded; in others they are of normal character.

These altered sediments and igneous rocks are overlain over large areas by widespread and much younger sediments — flat-bedded and slightly inclined conglomerates, grits, sandstones, shales, mudstones and limestones, principally of shades of chocolate and red, but also of greyish-green and yellow. They occupy almost the whole of north-eastern and northern Ashanti, and the southern, eastern and middle portions of the Northern Territories. In addition, they occur along the coast from Elmina to near the mouth of the Pra River, and from the east of Sekondi to near the Butre River. All these rocks except those on the coast-line have so far proved barren of fossils, while the coastal group has yielded only a few of indeterminate character. The age, therefore, of these rocks is unknown.

A series of clay-shales, mudstones and sandstones at Accra appears to belong to the same division. In the Beyin district, on the western portion of the coast-line, there are small outcrops of a yellow limestone with fragmentary fossils; it probably belongs to the Eocene period. Some of the marine terrace gravels and pebbles and bouldery clay along the coast-line may be of Pleistocene age, while the Recent deposits comprise river gravels and sands, alluvium, swamp and lagoon muds and beach sands and dunes forming at the present time.

It should be borne in mind that very large portions of the country are still quite unknown to the geologist.

The economic minerals and rocks so far discovered consist of gold (alluvial, lode and banket—an altered gold-bearing conglomerate), widely distributed in southern and eastern Ashanti, Akim, Denkyira, Wassaw, Ahanta and the Western Frontier; manganese ore in large quantities in the Takwa district; iron ores of wide distribution and good quality occurring as surface deposits in many parts of the country; tin and molybdenum ores in fair to small quantities in the Winneba district; oil-shales of poor quality, a little bitumen and heavy oil along the western coast; good bauxite (aluminium ore) on the Kwahu plateau, and very small quantities of copper and nickel ore, and asbestos in several places. There is a great variety of durable and handsome building stones and ornamental stones among the igneous rocks, limestones and white marble, while the last two are suitable for the manufacture of lime and cement.

Some of the clay-shales on the coast and the Kwahu Plateau are

suitable for fine pottery, while shales and slates fit for the manufacture of bricks and tiles are abundant. Good pigments could be made from the fresh and decayed slates and shales of different colours among the older and younger sediments and from the roasted pyrites of the mines.

In the sand and pisolite-gravel and cement resting on the great sandstones and shales series of Ashanti and the Northern Territories, and in those sandstones, vast quantities of rain-water are stored after the wet season. Where not issuing as springs or streams, this water can easily be obtained by digging small holes in suitable localities, and the wants of villages and towns supplied. This is a matter of great importance to the country with respect to the spread of settlement, since in the dry season there is no surface water over the greater portion of northern Ashanti and the Northern Territories. From the water-conservation point of view this series of rocks is of incalculable value to the country.

The coastal regions are by no means as well supplied with water as might be supposed. With the exception of the small strip of coast about Cape Three Points and the mouths of several rivers, the coast peoples in the dry season have to depend upon supplies of water obtained from soaks, water-holes, and more or less brackish lagoons, with the result that they suffer in health. These supplies could be greatly improved if the people would but expend more energy in augmenting their supplies by increasing the numbers of holes sunk, and protecting them from pollution and loss by evaporation. Similar remarks regarding native indifference and carelessness apply to the Northern Territories, the north-eastern portion of Ashanti and the Colony, and the country from the Akwapim Ranges eastward to Togoland.

The great forest belt, however, comprising physiographic divisions 2 and 3, has ample supplies of water in the innumerable streams that occur there, though all of them except those in uninhabited localities are polluted by the native habit of bathing and washing clothes and food supplies in them. For that reason it is unsafe to drink raw water from any stream rising in an inhabited area, even though the water may be clear and apparently pure.

There is only one real lake in the country, and that is the sacred Lake Bosumtwi in central Ashanti, about 18 miles south-east of Coomassie. This freshwater lake is roughly circular in shape, with a diameter of about 4 miles and an area of some 13 square miles. It lies in a deep depression, with steep sides rising to 600 and 700 feet above its surface. Its depth is unknown. An attempt was made to sound it by Mr. A. J. Philbrick, acting Chief Commissioner of Ashanti, but unfortunately when 500 feet of line had been let down it broke, and the attempt was abandoned. Though a lake with no outlet, and only a few small annual streams flowing into it, the water is fresh. Its general appearance suggests a volcanic origin, viz. that it is a caldera, but since no evidence whatever has been found on its north-

eastern and northern rim and shore of young volcanic rocks, that view is hardly tenable. The available evidence suggests its formation as due to subsidence. Numbers of villages stand on the shores of the lake. There are several interesting native beliefs about the lake. It is sacred to the Ashantis, who regard it as a great fetish. They believe that it is the seat of a powerful and energetic spirit which manifests itself intermittently on its open surface by flashing lights, making noises like the discharge of artillery, and in various other ways. No canoes, paddles, fish-hooks, or brass pans are allowed on or near it. Fish abound in the lake, and are caught in an ingenious manner by the natives. Plaited reed mats with gaping mouths are taken out from the shore by men lying face downwards on cigar-shaped logs of wood. They propel themselves by paddling with their hands, and having set and anchored the nets—mouths open—the lower platform just submerged, they retire for some time. The fish enter the trap and bask in the subdued sunlight, resting on the lower portion. The fishermen return almost noiselessly, pull together the two parts of the trap, capture the fish, and tow them and the trap ashore.

There is evidence throughout the country of its occupation by peoples who lived there before the present peoples came into the land. I have found several thousands of stone implements of rude form and finish and of Palæolithic types in various places; also others, ground and polished, of Neolithic types, distributed sporadically through most districts. The crude implements occur principally along the Accra coast, over the eastern coastal plains, throughout the Northern Territories, at various places along the western coast, and in the Kwahu highlands. I found them first in considerable numbers on the coastal plain at Accra. They comprise, *inter alia*, spear-heads, arrow-heads, knives, scrapers, chipped axes, hammerstones, bone-splitters, shell-breakers, and borers, rudely fashioned from pebbles of quartzites, quartz, etc. On the coastal cliffs south-west of Dixcove, and near Prince's Town, I found stone-factories littered with multitudes of chips and flakes, while near Axim the road passes through a wide low mound composed of thousands of such flakes. Many of these are of rocks which in a wet climate, such as that of the Gold Coast, decay fairly rapidly. There is a large proportion of the flakes showing little decay, many of them being nearly fresh in condition. This fact, together with the statements made by the people of the localities that they know nothing of the origin of such stones other than that they have come from the sky, suggests that they are the work of aborigines, whose disappearance was not in the remote past. It is highly probable, as certain writers have suggested, that some of the present tribes along the coast consist of a fusion of aborigines and of conquering peoples who invaded the country from the north, killed part of the aborigines and absorbed the remainder into their own tribes.

The credible history of many of the present peoples, on the evidence

of early European traders, dates back to the fifteenth century, so they must then have occupied the country. It seems probable, however, that at that time, and perhaps even later, the more inaccessible parts of the country possessed the remnants of at least one aboriginal race. Further, it appears not improbable that when the earliest European traders first went to the West Coast many of the people there were using stone implements, just as was the case in Australia and South Africa.

Ground axes or chisels of cylindrical and flat oval shapes, fashioned on both sides, can now be found on the surface of the ground in many parts of the country. They are certainly of Neolithic types, and throughout the country are regarded by the natives as having fallen from the sky. In the Kintampo district, northern Ashanti, and the Bwipe district, Northern Territories, there are numbers of round-ended, flattened pieces of weathered claystone or burnt clay, which are either plain or are ornamented with longitudinal, transverse, and oblique cuts, making check patterns of various kinds. The first examples of these were found by my colleague, Mr. B. K. N. Wyllie, on the ground in an area of subaërially eroded sandstone near Jemma. Subsequently I found numbers of others in that locality, and in the Kintampo, Tulundo, and Busunu localities, but nowhere else in the country traversed. The local people profess utter ignorance of them, and regard them as of similar origin to the stone implements. I found also at various places in the Northern Territories and northern Ashanti fragments of rough pottery, plain or ornamental—some with patterns not now seen among the present peoples—and in addition large and small pots, damaged or entire, placed in inverted positions, several inches deep in soil, on the tops of mounds, apparently formed naturally. Other interesting evidences of human handiwork found were: rounded stones of quartz, fashioned at stone factories on exposed rock surfaces; flat slabs or rounded blocks of stone with deep circular holes, as if the grinding holes of the rounded stones; long grooves of broad and narrow oval shapes made on flat stone surfaces—grinding hollows of some kind. These last were found along the rocky western coast, as well as in the northern country. All these are regarded by the local peoples of the districts where found as having been made by people other than their ancestors. Whether these are relics of aboriginal inhabitants, or merely those of the primitive ancestors of the present peoples, is a question that must await further evidence.

The principal tribes of the colony and Ashanti may be broadly divided into the Amanayas (Apollonians), Ahantas, Wassaws, Denkyiras, Tufels, Aowins, and Sefwis inhabiting the western part of the colony; the Inkoranzas, Tachimans, Ashantis, Adansis, Amansis (Juabins), Kwahus, Akims, Akwamus, Akwapims, and Fantis in the middle of the colony, and Ashanti; and the Gas, Krobos, Adangmes, Batos, Awunas, Agbosomes, and Aflaos in the east.

The last four are supposed to have descended from Ewe-speaking

VOLTA RIVER, MPEASEM, GOLD COAST COLONY, IN DRY SEASON

ABORIGINAL GRINDING HOLLOWS ON SANDSTONE

Volta River above Krachi, Gold Coast Colony

MAHOGANY LOGS AT EDGE OF FOREST, SEKONDI–COOMASSIE RAILWAY, GOLD COAST COLONY

KWAHU CATERERS AND HAUSA TRADERS, JANIKROM, GOLD COAST COLONY

MOSQUE, WA, NORTHERN TERRITORIES

people to the east; the Gas, Krobos and Adangmes from a fusion of these people with the aborigines; while all the others are regarded as belonging to the Agni–Ashanti or Tshi-speaking people. All are of negro origin, wholly or in part.

The people of the Northern Territories and north-eastern Ashanti embrace the Gyomas, Walas and Kagbanyas, supposed to belong to the Agni–Ashanti-speaking peoples; the Mamprusis, Dagombas, Fra Fras, Grunshis, Dagatis and Kanjargas. The first two speak a language closely allied to Moshi of French Niger, so perhaps have sprung from the same stock; while the others are supposed to be a fusion of aborigines of the country, with some conquering peoples of negro origin from the north.

In addition to the tribes mentioned, Hausas from Northern Nigeria have communities in all the large towns, and in many of the villages along the great trade routes. They all are Mohammedans, while there are also many Mohammedan Moshis, Dagombas and Walas. In certain towns, such as Wa and Larabanga, people professing this religion form a large or the greater portion of the inhabitants. At Wa there is quite a picturesque mosque. Most of the other natives are pagans, though the coastal region and some districts in Ashanti and the eastern part of the colony have about 100,000 Christians, belonging to the various missions, in order of number of members, viz. Wesleyan, Basel, Roman Catholic, Bremen, Episcopalian, African Methodist Episcopal and Baptist.

Apart from clerical duties and the work of trading firms, building and railways, the principal occupations of the people are farming, fishing, trading, stock-raising and mining. But there is a good deal of hunting, spinning and weaving, wicker-working, leather-working, salt-making, pot-making, catering and bee-keeping (in the Northern Territories).

Farming is general throughout the country, but is not of good character, and compares very unfavourably with that of the Ibos of Southern Nigeria. Fishing is done principally along the sea-coast, in the coastal lagoons and in the large rivers—the Volta and its larger tributaries. Great numbers of fishermen from the Adda and Kwitta districts, near the mouth of the Volta, ascend that river in canoes for hundreds of miles towards the end of the wet season, make camps at various places, catch and dry the fish and sell them to the local people, Coomassie traders, and those on the great stock routes. Large profits up to 300 per cent. are made on these fish when sold in Coomassie. The coastal fishermen are hardy, bold, and expert. It is most interesting to watch the canoes leave the shore and cross the foaming breakers, when from each one the line fixed to one end of the large seine net is cast off and brought ashore by a strong swimmer, breasting the surf; then to see the canoes hoist sail, beat up or down the coast, and return through the great rollers to the shore. As the nets are drawn in slowly and the leaping, shining mass of fish and flotsam dragged on to the beach, the fish are

eagerly collected by the entire women population of the village, while the small children dodge about picking up the small fish as chance offers, and parental vigilance is temporarily relaxed.

Sheep, goats, cattle and fowls are reared in the Northern Territories, and the French colonies beyond them, and brought regularly every dry season to the big markets in Coomassie. There many of them are killed and distributed, while others are sent by rail to the mines and the coast towns. Along the great trade routes from the Northern Territories to the south, principally to Coomassie, such as the eastern, viz. the Gambaga–Tamale–Salaga–Yeji–Ejura route; the middle, the Gambaga–Daboiya–Busunu–Kintampo–Inkoranza route; and the western, the Lorha–Wa–Bole–Wenchi route. The caravans consist of carriers with heavy loads of vegetable products and fowls in hausa baskets; of donkeys with large stuffed packs on their backs, on which are placed two baskets containing the merchandise; of small herds of cattle and flocks of smooth-haired sheep and goats; or of combinations of them all.

The stock routes are the scenes of many tragedies to both man and beast. The ideal country for travelling through in the dry season is such as the forest through which the three great trade routes converge on Coomassie. For the greater part of 100 miles from Coomassie the road passes through the shady forest, numerous villages, and numbers of streams of cool water where thirsty man and beast may drink, eat, and rest by the way under the great trees. But in the open grass country, or that of the thin forest type, subject to seasonal burning, and waterless save for soaks and shrinking holes at intervals of from 3 to 20 miles, travelling is anything but pleasant. Many donkeys, cattle, sheep, and goats fall exhausted by the wayside, and are killed, the flesh and skins of all but the first being carried away and sold in the nearest village. A donkey suffering from tsetse bites becomes too weak to travel and is abandoned. A man becomes ill, dies by the way, and is buried by his companions. Or, it may be, he is abandoned by them after being stripped of all his scanty possessions. On one occasion while cycling quickly past a grass fire rushing to the bare road, I saw a naked body on the roadside. There was just time to jump off and drag it away before the flames swept over the spot. The body was that of a dying man abandoned by his companions and ignored by scores of other natives who had passed by. He died as he was being conveyed to the nearest station. At another place is a grave covered with offerings of cowries and scraps of food, and almost surrounded with stones and brushwood. The entrance to the enclosure faces east, and on the road near by are scores of small mounds of gravelly earth, with one or more stones on each. This was said to be the grave of a devout Mohammedan of high social position. The enclosure and mounds had been formed by the contributions of stones, branches, and soil of every Mohammedan who had passed, and prayed at the spot that he might live as good a life and have as easy a death and revered a memory as he who had passed away.

At another place is a large spreading tree with its trunk encircled by a ring of cloth and strips of cloth hanging on the bark, and similar small heaps of soil on the road. This is said to be the death-place of a pious man, who had fallen ill and been left temporarily by his friend while he had gone to the nearest village for help. On his return no trace of the body had been found, but evidence of the usual post-mortem cleansing having been seen, the body was believed to have been taken up by Allah, for he "liked the man's palaver."

Mining is practically confined to men engaged on the large mines in southern Ashanti and Wassaw, though in some districts women get a good deal of alluvial gold by calabash washing.

Hunting in a systematic way by parties of hunters and beaters is done principally by Ashantis south of the Volta, and by Dagombas and Ashantis north of that river; but every bush village in a game region has its local hunters who kill game for their own use or for local sale. South of the Volta the weapons used are almost solely firearms, though traps of various kinds are also in use. North of that river where firearms are scarce the game is usually trapped or killed with bows and arrows and spears.

Spinning, weaving and dyeing are principally industries of the Northern Territories, though a good deal is done in some parts of Ashanti and the Colony. The yarn, spun from cotton locally grown, is usually white and blue, and narrow rolls of strong cloth are made by men sitting in the open or under trees, with the loom in the shade, and the long strips of yarn fastened to big stones 50 to 100 feet distant.

The making of baskets and bags of various kinds, and earthenware pots, even of large sizes—made entirely without mechanical aids—bowls, pipes, etc., is confined to certain towns or districts throughout the country, where the raw material is obtainable. Leather-dressing and manufacture of sandals, slippers, horse-trappings, purses and other articles are occupations principally of Hausas resident in the Territories and Ashanti, though the Ashantis and people in other parts are now learning the art. Salt-making is practically confined to the coastal peoples east of Accra, who evaporate the water of the sea or of brackish lagoons, and to the people of Daboiya on the White Volta, west of Tamale, Northern Territories. At the latter place weak brine is strengthened by soaking the saliferous sands on the river flat and the salt produced by evaporation The brine appears to come from a number of weak springs in a fracture zone associated with a volcanic neck—the stump of an old volcano—at that town. Catering is an occupation almost wholly restricted to the great trade routes, especially to those portions within the Northern Territories. Women wait at the roadside, at or near a village, with food already cooked, or they do their cooking on the spot. Bee-farming appears to be confined to the Territories. In certain districts there, as at Tamale and Daboiya, broken gourds, hollow logs, and palm-baskets,

closed at one end, are placed in trees, sometimes three or four in one tree, and the bees thus invited to occupy them. Hollow trees being scarce, numbers of swarms of the introduced European bee make their homes therein, only to lose their stores of honey and wax when ready for robbing. The people eat the honey, but do not sell the wax, as they have not yet found a market for it. So scarce are hollow trees owing to the ravages of fire and termites that some colonies of bees make their hives in strange places. One was found in an old termite nest below the surface of the ground at my camp at Portaw. Rather thoughtlessly I showed it to the local chief, and doubtless it no longer exists. Another was found in a hole in the face of a high wall of sandstone.

There are many indigenous plants of economic value or use in the country. The shea-nut and the oil-palm yield valuable oils from the juicy pericarps and the kernels of the nuts. The former grows only in the dry-zone open forests of northern Ashanti, but throughout the Northern Territories. The dawa dawa, a long bean like the locust-bean, has a rather sweet yellow pulp, which is eaten when ripe, while the seeds are crushed and made into a thick paste and sold. The piassava, or wine palm, found only in the moister country, is tapped for wine and is used largely for baskets, canoe poles, thatch for houses and cordage. The fan-palm is tapped for wine in many districts, a practice resulting in the destruction of fully a third of the trees tapped. Its timber is very valuable in the north, as it is exceedingly hard and resists termites. The silk cotton has a soft fluffy material in the seed-pods, which is used for stuffing pillows and mattresses. It also furnishes a light white timber much used for canoes. Rubber trees and rubber vines are plentiful in some of the forests of Ashanti and the Colony, but they yield a rubber inferior to that from the Para species. Cultivated Para rubber trees grow well in the wet zone. The kola tree has a distribution similar to that of the rubber tree, and is found associated with it in many places, where very fine examples of both can be seen. It would probably improve greatly under cultivation and the riddance of insect pests. The copal tree, yielding a good resin used for varnish, and the logwood and camwood dye-trees are found in the forests of the wet zone. Mahogany and odum are the two most valuable timbers in use, and they have a wide distribution in the wet-zone forests. Besides the export of mahogany logs, a great deal of timber, odum especially, is sawn for Government buildings, while from it and other kinds of trees the natives make the well-known Ashanti stools, and food mortars, pestles, implement handles, canoes and paddles. There are numbers of other plants used as food, such as several oil-beans in the thick forests, and a fruit like a cherry plum, another like a custard apple restricted to the dry zone. The gum acacia is rather common in some parts of the Territories. A dwarf date-palm grows well and bears good fruit on certain parts of the coast between Sekondi and Axim.

Cotton is grown for local use throughout the whole country, but the

attempt to develop a cotton-growing industry has proved a failure owing to various causes. Arrowroot is very common in the wet zone, but is apparently not used as a food, though its leaves are for thatching.

The cultivated plants are cocoa-bean, plantain, banana, yam, koko-yam, cassava, sugar-cane, maize, millet, ground-nut, coconut, bean, rice, okro, cucumber, spinach, pumpkin, pepper, orange, pawpaw, lime, mango, pineapple, avocado pear, guava, custard apple, melon, grape-fruit, and tobacco of quite good quality.

The coconut is grown principally along the sandy seashore, though it also grows well far inland. There is a prospect of developing a valuable copra industry. Millet, ground nuts, and the better tobacco are grown in the more open and drier districts of Ashanti and the Territories. Rice thrives along the swampy coast-line of Apollonia and in wet places in the Territories during the rainy season. Excellent rice, equal to large Patna in size of grain and flavour, is grown at Wa. The rest of the plants mentioned are confined principally to the moister country of the Colony and Ashanti, though yams, cassava, and maize flourish in the north, when planted at the proper time.

Lions are to be found in parts of the Northern Territories and in north-western and north-eastern Ashanti, where they may often be heard roaring in the evening or during the night at many places on the main routes. In the Gambaga district they are rather numerous. Leopards are common in the thick forests and the open forest country where caves afford shelter. The same may be said of the other felidæ—civets, gennets, and servals. Hyænas, jackals, and hunting-dogs are rare outside the Territories and northern Ashanti, but rather numerous in places there. The mungoose is plentiful in the drier parts of the country, and can be seen any day when one is travelling quietly along. The pretty tree-squirrels are confined to the dense forest of the wet regions and to the forest strip along the streams in the dry country. Porcupines are rather common in the drier areas, pangolins rare in the forests. The interesting tree-hyrax is confined to the thick forest country, where at night in some districts numbers of them make the forest ring with their loud, prolonged unmusical calls, a noise that differs very much from that of the hyrax of Southern Nigeria. The elephant frequents many parts of the Territories and some parts of Ashanti and the Colony. The hippopotamus is not uncommon in the deep pools of all the larger rivers in the Territories and the dry zone portions of the Colony and Ashanti, but it is also said to exist in the thick forest in the west of the Colony. The warthog and wild pig are common in the dry country north of Ashanti. Of the antelopes there are several species more or less plentiful. The hartebeest, roan, reedbuck, water-buck, cob, oribi and duiker roam over the lightly timbered country, especially in the Territories and northern Ashanti. The duiker is common in the thicker forests, where also the bushbuck is found. Buffaloes are

numerous in many parts of the country where high grass affords cover. The native hunters frequently shoot them, but they are not often seen when one is hunting big game. In the Territories there is a small animal like a hare which lives in the open grasslands and runs about the stations at night. In the dense forests and along wooded streams in the dry country long-tailed monkeys of various kinds are very plentiful. The chimpanzee is found in the thick forests in the west of the Colony and Ashanti. There is a belief among natives of different parts of the country that in the forests there live "bush people," who "walk like man," the females among them having breasts like women. It is said that when a lost child has been found by them it is carefully tended, and if, as it grows, it is dissatisfied with the life it is taken to the nearest road and shown the way to a village; otherwise it becomes one of themselves. An incident related to this belief occurred while I was camped at Inkwanta, near Sekodumase, Ashanti, in January last. A small boy, about five years old, was lost in the forest. When found and brought to my camp the next morning his experiences, as interpreted to me, were that he had wandered about through the bush, crying and frightened, till the forest ju ju had found and taken charge of him. But he had cried so much through the night that the ju ju had taken him to the road at daybreak and had left him there. The Ashanti name of this ju ju is Moatia. The native belief was related to me by several of my party after the interrogation of the child, and on my ridiculing it they were vehement in their protestations that it was true. Should there be any truth in the belief, perhaps the "bush people" are chimpanzees. Baboons are very numerous in the dry country, both on rocky hills and along the streams in the dry season. In common with the larger antelopes and elephants baboons do a great deal of damage to farms located some distance from villages. They are such a curse in some districts that no foodstuffs can be raised except immediately around the houses of the villages. A company of fifty to one hundred baboons or a herd of elephants will clear a field of maize in a few minutes, destroying much more than they eat. During the dry season, when water is very scarce except in the large streams, antelopes and baboons especially do not wander far from the streams. Good shooting can then be had by those who do not object to heavy walking through long grass, half burnt and trailing. Small insectivorous bats exist in great numbers in caves or dark hollows in rocks and trees throughout the country, but the large frugivorous species are not nearly so plentiful as they are in Southern Nigeria.

A small flying animal the size of a small squirrel and like the kinkajou or lemur is to be found at night in the Kintampo district. Rats and mice are very common, especially in the dry districts.

On the coast several kinds of sea-gulls are numerous. Fish-eagles, pelicans, cormorants, geese, ducks, kingfishers, plovers, herons, divers, darters, sandpipers, and stilts are plentiful along the largest streams or the

coastal lagoons. Hawks, crows, vultures, and parrots are not so numerous as they are in Southern Nigeria. Bustards are not common. Partridges, guinea-fowl, francolins, doves, pigeons, owls, and weaver-birds are numerous throughout the drier districts; while rollers, hornbills, plantain-eaters, and many others are common in the forests. The brilliant blue-black starling is a conspicuous figure in the dry northern districts. A species of heron or stork is protected at Daboiya on the White Volta River. The silk-cotton trees in the town are dotted with scores of their rude nests, where in the breeding season—February to March—the noise made by the young birds is continuous and distracting. Their appetites appear to be insatiable. The local chief states that he protects them because such was the custom of his forefathers.

Small tortoises are found in the timbered country and eaten by the natives. Turtles may be seen in the sea close to the shore along the whole length of the coast at certain times of the year. They swim about in the broken water inside the breakers till dusk, when they land and lay their eggs in the sand. Numbers of them are then caught and killed by the natives, who eat with relish their eggs and the choice parts of their flesh. Their shells dot the coast-line till buried by the restless sands.

Crocodiles infest all the large rivers, and in some places destroy human life. A small species lives in pools at the town of Wa. It is held sacred by the local people, who walk with perfect safety into the water near them.

Snakes are numerous in the coastal and forest belts, but not so in the riverless grass and open forest country that is seasonally burnt. There are many non-venomous kinds. The most venomous species are the deadly puff adder, black mamba ("cobra") and horned viper, and they are not infrequently seen and killed. Monitors, chameleons, and water-lizards are rather common, but much more so are the smooth-skinned and the scaly lizards.

Frogs abound in every watered spot, and croak joyously with the advent of the tornado rains. Loathsome toads occasionally intrude into the tent or house. They are abhorred by natives, some of whom regard them as bearers of leprosy. Fish of numerous kinds are extremely plentiful in the rivers, lagoons and sea. One of the most palatable is the freshwater catfish, which if carelessly handled gives a sharp electric shock. Grotesque mudfish relieve the gloom of the slimy mangrove swamps. Some fish and freshwater mussels estivate in the mud of dry holes and streams till the return of the rains. Great numbers of large freshwater oysters grow on the rocks in the Volta and its larger tributaries. Heaps of their old shells may be seen on the banks of these streams and on the plains adjacent. These shellfish are occasionally gathered by some of the present inhabitants, but eaten in their villages, so the heaps are probably relics of aborigines. Land snails are plentiful in the forests. The large ones, up to 8 inches in length, are considered a delicacy by the natives.

Slender sand-crabs in myriads race after the receding waves on the

coast or lie flat under those advancing as they forage for flotsam; or they scavenge the dead turtles on the beach. Large spotted rock-crabs in the tidal zone slide down the slippery rocks and flop into the sea on the approach of man. These are eagerly sought for food by the natives. Thousands of small hermit-crabs live in the shells of gastropods, and crawl over the mud of the coastal lagoons. Large black scorpions, up to 8 inches in length, are common in the forest country, and smaller, though relatively more poisonous, brown ones live in dry and open country. Centipedes are usually rather small and not obtrusive. Millipedes are abundant in the forests. Spiders exist in endless variety and numbers. Crickets by night and cicadas by day rival each other with distracting noises. Locusts and grasshoppers are not as numerous as might be expected. The quaint mantis frequently obtrudes itself by day or night on to the dining table or one's face. In some districts, such as Kwahu, this insect is so infested abdominally with long slender worms, possibly gordius, as to be unable to fly or jump. Gorgeous butterflies of many varieties, in clusters or singly, grace the paths through the forest, or the moist parts of the dry country. Moths and other winged pests not infrequently spoil the meal and the temper of man with their persistent and blundering attentions. Beetles of numerous kinds act as scavengers of the roads, or spoliators of young millet and dry skins. Not the least objectionable of insects are the cockroaches which abound in some districts, eat boots and leggings, and bite one when asleep. Mosquitoes are not so troublesome nor so plentiful as might be expected, though in swampy districts they are numerous. The result of the vigorous action taken by the medical authorities for their extirpation, especially of the species conveying the germs of malarial and yellow fevers, is clearly reflected in the improvement of the health of the people generally. Far more difficult to be guarded against than mosquitoes are tsetse flies, the carriers of the germs of sleeping sickness to man and beast. These cunning, actively pertinacious and exasperating flies infest the great trade routes and the borders of streams in many parts of the country. It is practically impossible to escape from being bitten by them, for they can pierce even thick clothes. Patiently and unobtrusively they wait their chance for successful attack. The mosquito can be killed with a slight pressure, but the tsetse has to be squashed, or beheaded, the method adopted by the native.

There are several kinds of small stingless native bees. They build in niches and cracks in rocky cliffs and trees. The honey is stored in long irregular thin tubes of wax. The smallest kind is extremely annoying in some of the dry districts, for it crawls over exposed portions of one's body as it sucks the perspiration. Wasps and hornets are plentiful. Small colonies of wasps build combs of hexagonal cells on branches of trees, and fiercely attack the careless intruder. Natives are much afraid of them.

Ants are the most interesting insects in the country. There are several

kinds that deserve special mention. Foremost are the drivers, with their highly organized communal system and ceaseless energy. In their countless hordes they are the great destroyers of animal life, and the scavengers of everything fleshy. Nothing is more dreaded by disabled man and the lower animal creation than driver-ants. Foraging ants in small parties or companies raid the homes of other insects. Pale brown tree-ants infest certain kinds of trees, among them the kola. Their nests are made in curled leaves, often held together by cobwebs, apparently the discarded homes of spiders, for both kinds of insects are frequently found on the same tree. There is a belief in northern Ashanti that the kola trees that are covered with both ants and spiders bear the best fruit. Probably noxious pests of the kola are destroyed by these insects. Small black ants run up trees in endless columns and get their food of small insects in the branches. Both these kinds of ants are troublesome to the bushman, for they fall in showers on him as he cuts or shakes the trees, and they at once begin the attack. The bite of the black ant is irritating, while that of the brown one is little beyond a pinch, though the ant has to be forcibly pulled off the skin. The large dark stench-ants live in small colonies in holes in the ground. When crushed they emit a most disagreeable, pungent, nauseating smell. Small termites are such a nuisance in some parts of the country that no wood is safe from their attacks. They build mud-tunnels on the lower cemented or mud-plastered portions of houses and through them reach the wooden wall-plates and rafters, which they soon destroy. The mound-building kinds are found in the grasslands and thin forests of the drier country, where their pointed mounds of red earth are striking objects in the landscape.

The main causes of the slow development of the Northern Territories appear to be the lack of cheap and rapid transport to and from the coast, the small population of the southern portion of the country, and the indifference of the people regarding the production of food supplies beyond local needs. The country is in no sense a naturally poor one, for though large portions of it are waterless or nearly so in the dry season, so far as relates to surface water, there are ample supplies obtainable at a few feet below the surface over practically all that area. The soil is quite as good as that of many parts of Ashanti and the Colony, and should be capable of growing greatly increased supplies of food.

Maize thrives and yields well if planted in the proper season and in suitable localities. There seems to be no valid reason why a valuable maize industry should not be developed. The same may be said of ground-nuts and rice. The fact that rice of very good quality is grown at Wa, Tamale, and other places shows that the production of this grain can be enormously increased when remembering the character of the country. There are large areas in the mid-Volta valley and along other streams which are annually covered with still water for a considerable time. Rice sown there at the proper time should mature before the dry season

becomes too far advanced. Besides, with the aid of conserved water for irrigation, other areas could be similarly utilized for aquatic rice, while hill rice should grow well in many districts. The country and climate appear to be suitable for the growth of wheat. This valuable cereal is grown for food in some parts of Northern Nigeria having a climate and conditions resembling those of many parts of the Northern Territories. A wheat industry would be certain to find a market in the colony and Ashanti for its surplus grain, while eventually an export trade in it might be established.

The shea-nut tree is widely dispersed over the country. It flourishes and as a rule bears good fruit. But at the present time much of the fruit is destroyed by the seasonal burning of grass, and only a small proportion of that which matures is collected and shea butter produced for export. This industry is capable of great expansion, even if confined to the produce of wild trees; whereas with cultivation in plantations the shea-nut should be much improved and the production proportionately increased.

Cattle, sheep, and goats are easily reared, and thrive in the country. The demand for meat, especially in the populous centres of Ashanti and the Colony, is a progressive one. The supplies of stock that are now travelled for hundreds of miles from the northern districts and from French territory do not nearly meet the present demand, so there are strong reasons for believing that a local stock-raising industry could be developed in the south, and that of the north largely increased by the establishment of rapid and cheap transit.

Population is steadily growing, even in the mid-Volta basin, which was so ruthlessly ravaged by Samory in 1896–7. With broadened intercourse with the more progressive peoples to the south and the steady advance of civilization, the material wants of these northern peoples will grow, their energy and ambition will be stimulated, the products of established industries largely increased, and new industries probably developed.

This paper has been prepared from personal observations made during three tours (years 1913–16), comprising nineteen months, during which some 4700 miles were travelled by bicyle, foot, canoe, and rail. In a country such as the Gold Coast, the geology of which was previously almost unknown beyond the limits of the goldfields, the work has of necessity been of the nature of a reconnaissance rather than a careful survey. Large portions of the country are still unknown to the geologist, so no definite opinions have been formed regarding the ages of its deposits and the origin of its geographical features.

The accompanying map shows the political divisions of the country and the main routes taken by the Survey.

The photographs illustrating the paper are a selection from 450 taken by myself.

I desire to acknowledge the courtesy and assistance received from officials of the Government Service and of mining and commercial interests. I am specially indebted to Mr. F. C. Fuller, C.M.G., Chief Commissioner

of Ashanti; Captain C. H. Armitage, D.S.O., C.M.G., Chief Commissioner of the Northern Territories; Mr. A. J. Philbrick, Acting Chief Commissioner, Ashanti; Major B. Moutray-Read, Acting Chief Commissioner, Northern Territories; and my colleague, Mr. B. K. N. Wyllie, M.A., B.SC.

Before the paper the PRESIDENT said: I will ask Mr. Kitson to read his paper on the Gold Coast. It is a subject on which he speaks with authority. He has been there on several visits, engaged on geological surveys under the Government. He has previously given us a paper upon Nigeria, and I am sure he will be able to tell us a great deal about an interesting colony.

(*Mr. Kitson then read the paper printed above and a discussion followed.*)

Mr. AMAURY TALBOT: I regret I have nothing of value to add to Mr. Kitson's valuable paper. My acquaintance with the Gold Coast is limited to two or three excursions on shore and coasting along it about a dozen times. Perhaps one of the most interesting statements in the lecture was that the whole coast is lifting up and the land encroaching on the sea. A little to the west the reverse is certainly the case, if a personal observation and the statements of witnesses can be relied on. Lower down, again, on the delta of the Cross River, the land is encroaching also. The fetish lake near Coomassie has its counterparts in many regions of the coast, especially among the Ekoi of the Cameroons and the Ibos of the Niger delta; only in these latter waters fishing is usually taboo. Among the creeks of the Niger delta dwell genii which are reported to send forth flashes of light, while among Kalabari luminous faces are supposed to float over the water. I think the natives on the trade routes shown in the map were Hausas; if so, that is another example of the advance of these people to the coast. There has been great progress in that way in recent days, and they are now coming down in hundreds. Mr. Kitson referred in a spirit of calm neutrality to the subject of the burning of bush. That is a very vexed question, and one that obtains greater prominence in Southern Nigeria than on the Gold Coast. Mr. Kitson's story of the little boy who was lost and found is in contrast to the belief of the peoples to the east of this region, who say that the big monkeys of the forest are very harmful and attack them with sticks and stones, whereas in the Gold Coast they are reckoned as friends. A story was told me by my Bornuese skinner that his little brother was lost when about two months old, and only recovered at the age of nine to ten years, having been brought up by an antelope during that interval. I should like to congratulate Mr. Kitson upon his excellent slides and lecture, and to say it would be of great advantage if we had many more men who, like him, would take an interest in both land and peoples of the West Coast. It seems to me of vital importance to this Empire that Britain should rule the tribes entrusted to her charge with justice and sympathy, and this cannot be done unless their ways of thought, beliefs, and customs are studied and considered.

Mr. ARTHUR HUDSON: As one who has spent some sixteen years in West Africa, the last four of which I spent as Attorney-General of the Gold Coast, I should like to thank the lecturer for the highly interesting evening he has given me. It would be rash, not to say inconsiderate, at this late hour to talk generally and at length about the Gold Coast, but I should like to confirm one or two things the lecturer told us about the great strides the Gold Coast has made during recent years. In 1897 the revenue of the Gold Coast was something under a quarter of a million; ten years later, in 1907, it had risen to something like three-quarters of a million; and just before the war, in 1914, the

revenue had already arrived at the considerable sum of something over one and a quarter million, and shipping exports and imports have progressed in the same extraordinary way. During my time in the Gold Coast we built about 34 miles of railway from Accra, to tap that wonderful cocoa industry, the great increase of which we have been told. I remember the Director of the railway asking me to come down to the station at Accra shortly after the railway was built, and that station was really like a sea of cocoa ; there were sacks of cocoa everywhere and the sheds were overflowing with it ; in fact, the Director told me he was bringing down something like 300 tons of cocoa a day. Unless one had seen cocoa at close quarters like that, one would hardly realize the enormous industry it has become. At one time, I believe, Trinidad was ahead with this industry, but now I am sure the Gold Coast is easily first of all our colonies as a cocoa-bearing colony. I have enjoyed what the lecturer has told us, and I have not the least doubt everybody else here has done the same.

The PRESIDENT : I will now return our thanks to the lecturer, Mr. Kitson, for his very interesting lecture. He has touched upon many matters of interest in the account he has given us of a country he knows well. I think two points in his lecture must have specially struck the meeting. The first of these is the very great breadth of the interests which Mr. Kitson showed. In these days we are too much accustomed to the specialist who thinks only of his own particular pursuit, whatever it may be. Mr. Kitson has shown how it is possible to have your own pursuit and yet give proof of wide interest in very various subjects : ethnology, antiquities, commerce, the future development of our colonies. The second point is the last remark in his paper, when he said that our Government and Colonial Office are recognizing the importance of science and the employment of scientific officials. That is a step in a direction in which we have lessons to learn from others ; I trust they have been learned and will not be forgotten after the war.

GEOGRAPHY IN THE UNITED STATES.

Geo. G. Chisholm.

A FEW years ago the *Journal* contained an article (vol. 35 (1910) pp. 419–425) by Mr. R. H. Whitbeck, of the University of Wisconsin, Madison, entitled " The Present Trend of Geography in the United States." The general drift of that article was to show from evidence derived from five sources that the trend at that time was away from schemes of study that had placed " too much emphasis upon the detailed study and classification of land-forms," and to lay more stress upon human response to these forms.

Since that date an important addition has been made to the periodical literature of American geography, and indeed of geography generally, in the publication of the *Annals of the Association of American Geographers*, which appeared for the first four years of its existence under the editorship of Prof. Richard E. Dodge, of the Teachers' College, Columbia University, and in 1915 under that of Prof. Harlan H. Barrows, of the University of Chicago. That makes it worth while to examine these volumes with

some attention to see what indications they afford of the attitude towards geography in the United States, and the present article will be devoted more particularly to the consideration of the last two volumes, 4 and 5 (1914 and 1915), of this publication. The articles are all by writers who stand in the forefront as representatives of geography in the United States. Most of them are long and elaborate, affording evidence of painstaking care and earnest endeavour. It should be mentioned, however, that light is thrown not merely by these articles printed in full, but also by the lists of titles, in most cases accompanied by short abstracts, of the papers read at the annual meetings of the Association held now in one city, now in another, as well as by the titles of papers read at joint meetings of the Association with the American Geographical Society of New York.

In entering upon our consideration of these two volumes it may be well, in view of Mr. Whitbeck's conclusion stated above, to begin with the paper in vol. 5 (pp. 61–105), on "The Principles of Geographical Description," by W. M. Davis, *Emeritus* Professor of Geology in Harvard University, long well known to readers of this *Journal* through his advocacy and illustration of his views on the study of geography—views which, it is well known, have had a powerful influence not merely in the United States but also in various European and other countries. To him probably it was chiefly due that in the schools of the United States the study of geography had shown an extreme tendency to the physical side, against which Mr. Whitbeck noted a reaction as in progress. But in ascribing (conjecturally) that tendency to Prof. Davis's influence we would not assert that his own conception of the scope of geography is thereby indicated. That we will endeavour to ascertain from an examination of his paper. But before beginning that examination we should like to call attention to a sign of the care with which the papers in these *Annals* are prepared for publication in the statement that this paper, originally prepared for presentation at the Princeton meeting of the Association in December 1913, was twice submitted to censors (the second time in consequence of the change of editorship) and twice revised as the result of comments for which the censors are thanked by the author.

The paper is an exposition and defence of the author's well-known views on geographical terminology, but in spite of repeated endeavours to make the intention clear (p. 62) the present writer has to confess that he is still left in some doubt as to the author's meaning, and accordingly as to what he regards as included within the aims of the geographer. The author states (p. 63) that his purpose is "to consider the fundamental principles in accordance with which local and general regional descriptions should be prepared." He puts forward his system of nomenclature with the answering concepts as furnishing the most complete and precise mental equipment for the description of the Earth as it actually is. Readers of this *Journal* hardly need to be reminded that this system of nomenclature is founded on an analysis of the changes which the Earth's

crust undergoes in consequence of the action of natural agents. The forms resulting from such changes vary in accordance with the structure of the rock exposed to such action, the nature of the agents or of the process to which they are subjected, and the stage of progress towards the ultimate goal to which the process tends. Structure, process, and stage are the three prime factors essential in any thorough treatment of land forms (p. 73), and by giving appropriate names to the typical forms determined by those factors we furnish ourselves with a set of terms for purposes of description more complete and more definite than can be obtained in any other way.

Now all this may, for the sake of argument, be granted. This explanatory or genetic terminology which Prof. Davis contrasts with a merely empirical equipment based chiefly on "observation, memory, comparison, and generalization" (p. 65), may be the most adequate for the purposes of the geographer. But after all it is so merely because it serves to designate distinctive forms visible to the eye and picturable to the mind's eye. The geographer in using the terms so obtained does not need to trouble himself about the origin of the forms for which considerations as to process, that is, geological history, have suggested names. Prof. Davis almost seems to recognize this. For he points out (pp. 69–70) that "the chief danger of the explanatory method [of description] is not the possibility of error, but rather the probability of distraction from geographical to geological, biological, or historical considerations by the introduction of complicated and irrelevant discussions. This is particularly true of physiographic studies. Many a modern physiographic essay is so largely concerned with the analytical explanation of land forms rather than with their explanatory description, and the analytical explanation is made so unnecessarily elaborate by its extension into the remote geological past and by its employment of geographically irrelevant geological terms, that whatever geographical value the essay possesses is nearly lost from sight in the blinding abundance of non-geographical matters." And again on the next page: "The presentation of geographical analysis will, even if abbreviated, lead both writer and reader far away from the visible features of a landscape, for such a presentation exhibits the search for and discovery of an explanation, rather than its application; it may involve much geological, physical, biological, or historical study, and hence it should not be regarded as strictly geographical matter."

But the very term "explanatory description" is somewhat ambiguous. The geographical point of view has nothing to do with the explanation of the past. When the geographer thinks of such explanation he is thinking geologically however condensed the expression of his thought may be. One might almost think that Prof. Davis himself holds that view, for he says (p. 71): "It should be explicitly pointed out that the object of explanatory description is not to reveal the past conditions from which present conditions have been developed, but to present the present conditions in

terms of their origin." But if so why does he make it a merit in his system that when applied to a given area it leads "to a fair idea of its past and future as well as of its present form" (p. 69)? Why is it of importance that "the rationalist" (that is, one who makes use of his genetic terminology) should come "to feel reasonably assured that his explanatory inferences as to the origin of the existing features are correct" (p. 80)? Why, too, does he accuse geographers of a certain timidity in leaving to others the investigations on which explanatory descriptions are based (p. 69)? It is simply by his own showing not their business. Let us take a parallel case. Attention has lately been called again and again to the diminution in yield and the deterioration in quality of the cotton grown in the Egyptian delta. That is a serious alteration in geographical values, and the geographer certainly wants to know the reason or reasons of those changes. Various explanations have been suggested. According to some they are due to the exceptional rise at an unfortunate time of the underground water-level in the delta in consequence of the increased storage of irrigation water—considerations belonging to physics and physiological botany. According to others changes in the chemical composition of the irrigation water are at least a contributary cause. Here chemistry is also brought in. Now the geographer may enter on these investigations if he happens to have the necessary physical, botanical, and chemical equipment, but as a geographer he will prefer to leave them to the physicist, botanist, and chemist and take their results. Such appeals from one science to another are constant, but the sciences remain distinct in their aims.

Further, let it be noted that Prof. Davis himself recognizes that to use the genetic terminology it is not absolutely necessary to know the geological history, the actual explanation of the forms of the particular region to the description of which the terms are applied. One may, he says (p. 71), safeguard oneself against erroneous explanatory description by using such phrases as "It appears to be . . ." "It seems as if . . ." To this we would only add that if the terminology is there only for purposes of geographical description it may not matter to the geographer at all whether the implied explanation is right or wrong. Let us take an illustration from the use of one of those explanatory terms which, Prof. Davis points out, "empiricists" have always used freely, the term *delta*. As an explanatory term this designates a flood-plain at the mouth of a river built up originally from a sea (or lake) bottom. But all the characters with which the geographer as such is concerned are those which belong to it as a flood-plain at or near the mouth of a river, whatever the bottom at any particular part may have been. Thus Supan says if the blue clay on which the recent alluvium of the Mississippi is deposited is not entirely of river origin then the delta of that river begins at the mouth of the Ohio. But the geographer may if he likes apply the term contentedly from that point downwards in any case. If the geologist wants to know whether that is correct as implying the assumption mentioned by Supan, let him find out.

But note that we have said not that it *does* not matter, but that it *may* not matter to the geographer whether the explanation implied in using a genetic term for description is right or wrong. Take this example. A monadnock may easily simulate the form of a typical volcano. We can imagine therefore a traveller, in describing a region that he has not time fully to examine, speaking of a mountain observed in some part of the field of view as either a volcano or a monadnock. But it makes a geographical difference, implies differences in influence, whether it is the one or the other. A monadnock is related in structure to the surrounding region. A volcano is not. It is what we have heard Prof. Davis speak of as "an accident," the impertinent intrusion of a new object for process to work on. But it may, and indeed probably will, have for that very reason, as well as on account of differences in structure and chemical composition, important influences geographically which would not proceed from the monadnock.

Before leaving this paper we would guard ourselves against two misconceptions that may arise from the foregoing comments. First, we would not have it understood that we object in principle to a system of genetic terminology. The terms may be of great utility, but, we contend, the geographer must insist on his right to use them without inquiry into the actual history of the region that he may wish to describe by means of them, except in so far as that history is revealed on the surface or at those depths below the surface which the geographer as a student of local influences finds it necessary to investigate. That this study of local influences is the ultimate aim of the geographer seems to be recognized by Prof. Davis himself in the way in which he sums up on p. 85 his study of the meandering valley of the Armançon by emphasizing its influences of various kinds on human geography.

Secondly, we would not be understood to deprecate the study as a branch of geography of what has long been known as physical geography. Quite the reverse. True, physical geography is primarily a study of processes, and accordingly as such is indissolubly attached to geology. But we hold that geography, and indeed in particular human geography, stands in a peculiarly intimate relation to geology on three grounds.

First, inasmuch as the characteristics of the Earth's surface as advantageous or disadvantageous to man correspond in a large measure with the geological structure. In accordance with that structure the surface is mountainous, hilly, or level; fertile or infertile; permeable or impermeable to water; rich or poor in economic minerals. In consequence of this correspondence we would demur to Prof. Davis's precept for eschewing in geographical descriptions "the names of geological formations, such as Carboniferous, Triassic, or Tertiary" (p. 90). So close, indeed, in some cases is the correspondence between the land forms and the geological formations that, we understand, the boundaries of these formations can be mapped to a large extent merely as indicated by the land-forms. Without

doubt such terms cannot be used in geography with the general significance of terms suggested by structure, process, and stage. Carboniferous limestone has not the same significance in respect of surface features in Ireland as in England, but that fact does not deprive such terms of their utility in geography.

Second, a close relation between geography and geology arises from the fact that, while it is not the business of the geographer to inquire into the history of any district or region, it may sometimes be convenient for him to learn from the geologist what that history has been, so as to bring some rather complicated area under one point of view for purposes of description. Perhaps the simplest illustration of this that could be given is to be found in the distribution of English coalfields on opposite sides of the Pennine Chain. A somewhat more complex and more interesting example is presented by the Weald district in England. A still more complex and more interesting illustration the present writer has had the pleasure to hear Prof. Davis develop in his account of "The Physiographic Subdivisions of the Appalachian Mountain System and their Effects upon Settlement and History" at the Dublin meeting of the British Association (1908).

Third, perhaps the most intimate of all the relations between geography and geology is founded on the fact that the same causes as are constantly affecting the value more particularly for man of local conditions and place relations are those which are now recognized as explaining the whole of geological history. It is on this ground that physical geography is a common preliminary or at least ancillary study for both the geographer and the geologist. Both must study the action of heat and cold, of the winds, of running water both above and below ground, and many other things, but each with his own reference. So much are they both at one in this that it would be pedantic to try to maintain this reference with exclusive rigour. Still it would be well, where geography and not geology is the aim, in expounding the action of running water, for example, to lay stress rather on the encumbering of rivers with sediment, the maintenance of underground supplies of water at the base of hills, and the renewing of soil on low grounds than on the deepening and widening of valleys; and so in many other cases. It is under this head, if genetic terms of description are adopted, that the study of process will come in to make these terms intelligible, and that it will be appropriate to aim at what Prof. Davis calls (p. 78) systematization, that is, the thinking out in advance of the working of a process to its goal, and thus to have a complete set of terms for the forms brought about as modified by structure and determined by stage.

In this, the most physical of all the papers in the two volumes, Prof. Davis, we have already seen, pays homage to geography in its relation to life, and this he does still more expressly in the latter part of the paper where he discusses the treatment of plants and animals (pp. 95–98) and

cities (pp. 98–99) in regional geography. No less is this true of three other papers which may be appropriately taken together, in one of which at least the influence of Davis is noticeable. The papers referred to all deal with the subdivision of North America or the United States into regions. One is by Mr. W. L. G. Joerg, of the American Geographical Society of New York, on "The Subdivision of North America into Natural Regions" (vol. 4, pp. 55–83), another by Prof. Fennemann, of the University of Cincinnati, on "Physiographic Boundaries within the United States" (vol. 4, pp. 84–134), and the third by Prof. Dryer, of the Indiana State Normal School, on "Natural Economic Regions" (vol. 5, pp. 121–125).

Prof. Fennemann, referring to Davis's formula basing topography on structure, process, and stage, remarks (p. 87) that "more good topographic contrasts between adjacent areas are due to structure than to either of the other elements." The result is that his map showing physiographic boundaries is one based entirely or almost entirely on such facts as might be observed in the field by a geographer unconcerned with process or stage, or plotted in accordance with climatic and other data which the geographer must always take into account; and Prof. Fennemann informs us that his "division of the United States into provinces serves two purposes: first, for the discussion and explanation of the physical features of the country [that is, a purpose largely geological]; second, as a basis for the plotting and discussion of social, industrial, historical and other data of distinctly human concern," which he himself describes as a "distinctly geographic purpose."

The main feature of Mr. Joerg's paper is a survey of the most important previous subdivisions either of the United States or of the whole of North America. Twenty-one figures giving such subdivisions on various bases, structural, climatic, vegetational, zoogeographic and composite, are reproduced in maps on the same projection (Bonne's) and on the same scale for corresponding areas (all those of the United States on one scale, those of North America on another, smaller scale). A twenty-second map with its legend gives Mr. Joerg's own division, which is offered, he tells us (p. 61), merely as tentative, arrived at solely by selecting what he considered the best features in the previous divisions.

Mr. Joerg considers structure and relief, climate, and vegetation as the elements composing a natural region. Of these he regards only relief and climate as co-ordinate, and includes vegetation chiefly as affording a very delicate index of climate (p. 57). On the other hand, he says, "reflection will show that anthropogeographic factors are not suitable criteria." Unquestionably, and for the reason he gives. "Natural regions may be said to represent environmental types: it would obviously be confusing cause and consequence to apply the phenomena of human geography in their definition" (p. 56). "This exclusion of the human element," he adds, "does not imply any disparagement of anthropogeography." Certainly not: it places it on a pedestal; for, as Mr. Joerg puts it, "it may be said that the

recognition of the desirability of subdividing the earth's surface into natural regions is a direct consequence of the development of regional anthropo-geography."

Prof. Dryer's contention is that the division of the Earth into natural regions is worth doing only because "it will facilitate the study and presentation of the relations existing between human activities and natural environments," that "in *economic influence* [author's italics] may be found a standard for estimating the relative value of the different factors which make up a composite natural region" (p. 122). Hence he assigns to climate and vegetation a controlling influence and only a subordinate place to structure and relief in determining a natural economic complex (p. 125). The divisions resulting from the application of this principle are much larger than those of Fennemann and Joerg. There is no map attached to the paper, but Prof. Dryer tells us (p. 124) that "the United States belongs to five or six natural economic provinces," and one who has access to Prof. Dryer's 'High School Geography' may learn what the provinces he has in his mind are from the map on pp. 328–9 in that book.

A short paper (vol. 5, pp. 127–129) by F. E. Matthes, of the Geological Survey, Washington, gives an account of a "Conference on the Delineation of Physiographic Provinces in the United States" which arose out of the presentation of the two papers by Prof. Fennemann and Mr. Joerg, and ended with a recommendation "to the Council of the Association the appointment of a committee to undertake the preparation of a physiographic map of the United States with the co-operation of all American geographers and geographic institutions interested in that work."

We pass now to another paper of a physical character, but one in which the human reference is even more pronounced than in any of the papers already discussed except the last. It is that of Prof. Robert De C. Ward, of Harvard University, on "The Weather Element in American Climates" (vol. 4, pp. 3–54). In the general drift of this paper there is nothing really new. It may indeed be described as an exposition and illustration of what is involved in the definition of climate. "Climate is the average of weather. Careful records of *weather*, continued for many years, give *climatic averages*" (p. 3). But we are apt to think of averages as normal, which is a far from appropriate adjective to designate climatic averages, or even as usual, an adjective which takes us still further from the facts. What is set forth in this paper is the amount not merely of seasonal but even daily diversity that is summed up in climatic averages in different periods of the year in different parts of the United States, above all perhaps the north-east of the United States, an amount of diversity far beyond our experience in this country, together with explanations of the manner in which this diversity is brought about. There are numerous illustrations showing generalized storm-paths of different seasons, the features of different weather-types on successive days, barograph and thermograph records; and none is more instructive than these last as revealing strikingly the diversity referred to.

One may note particularly, for example, Fig. 27 on p. 36, in which the thermograph and barograph records are given one above the other for the period from noon on a certain December 31 to noon on the following January 4, apparently (though this is not expressly stated) at Harvard University, Cambridge, Mass. The close correspondence between the highs and the low of the barograph on the one hand and the lows and the high of the thermograph on the other hand strikes one at a glance. If we may venture on a suggestion we may say that we should like to see another paper, even if it be a short one, by the same author, giving and discussing actual storm-paths by way of supplement to the generalized storm-paths. We should like to see in what degree those generalized storm-paths represent a normal, or whether the actual storm-paths in the United States like many of our own storm-paths laugh at our norms and turn about in abrupt twists and reversals.

The next paper that we shall notice is one of avowedly human interest, that by Miss Ellen C. Semple on "The Barrier Boundary of the Mediterranean Basin and its Northern Breaches as Factors in History" (vol. 5, pp. 27–59). It is an altogether admirable illustration of the light that geography may be made to throw on the history of a particular region. By those who are interested in this aspect of geography it will be read with eagerness throughout, but perhaps there is nothing in it that will equal in interest for geographers the account that the author gives of the great geographical significance of the "Peartree" Pass, the easiest approach to Italy from the Danube, at any rate from the lower Danube valley. It might be called the Khaibar of Italy, a part of Europe which on a small scale presents so many interesting analogies to India. It is the pass of which an account is given by the President of this Society under the name of Birnbaumer Wald in vol. 46 of this *Journal* (p. 428). Miss Semple describes it as the back door of Italy, and nowhere have we seen such a full statement of its geographical significance as that which she gives on pp. 32–44 of this paper.

Another paper with a distinctly human reference is the account (vol. 5, pp. 107–119) written by Herbert E. Gregory of "The Oasis of Tuba, Arizona," the only settlement of note in the Western Navajo Reservation, an area of about 7000 square miles with a total population of less than 7000 individuals mainly nomadic Indians, in northern Arizona and southern Utah. This oasis, thanks to the protection of the white man, is now once more cultivated by the Hopis, the descendants in all probability of the cliff dwellers the remains of whose villages are to be seen in the neighbourhood. Citing a paper by Walter Hugh on "The Hopi in Relation to their Plant Environment," the author briefly indicates (p. 113) how close that adaptation is, as well as that of the vegetation to the character of the climate.

We have thus noticed all the papers in these two volumes except two, one personal in its content, a brief memoir of W. W. Rockhill by William

Churchill (vol. 5, pp. 131–33), the other a paper by W. P. Brigham, Prof. of Geology, Colgate University, Hamilton, N.Y., on "Problems of Geographic Influence" (vol. 5, pp. 3–25), one of the most important of all. We have reserved this for consideration to the last because none seems to be more significant of the meaning which geography is coming more and more definitely to acquire in the United States. From this point of view its key-note may be said to be given in the opening sentences. "We deal here with the heart of geography. The ties, infinite in number, which bind life to the earth lead surely up to man. No other phase of the subject is so insistent and so appealing as the earth's influence upon our kind." And later on: "After all that can be said on the relations of geography to other subjects, I am content to come back to a confessedly general, but safe and truthful word by James Bryce: 'Geography is the point of contact between the sciences of nature taken altogether and the branches of inquiry which deal with man and his institutions'" (p. 17). In keeping with this the author lays stress on the relations between geography and history. "The old geography," he says, "knew little of the causal and historical, and some of the old history might just as well have been staged on a flat platform projected into the interplanetary ether;" but the modern historian "will respond with open hand to every real offering of the geographer" (p. 4). And in confirmation of this it is worth while to add the assurance of a modern historian. Speaking at a joint meeting of the Geographical and Historical Associations (England) held at University College, London, on 7 January 1916, Prof. Ramsay Muir, of the University of Liverpool, said: "I want in the presence of members of the Geographical Association to make on my own behalf and on behalf of my fellow-historians the confession that in our treatment of history we have as a special rule far too much undervalued the illumination and the assistance that we can derive from geography. To put it quite simply, we have used our maps too little, and especially we have neglected to use our physical maps. We have too often failed to make clear to our pupils the nature of the scene in which the action takes place, and the extent to which the action itself is affected by the scene" (Report of the discussion in the *Geographical Teacher*, vol. 8 (1916), p. 236). Historians in the past are perhaps not to blame for this. If Gibbon had had at his disposal the maps that modern historians can make use of, there can hardly be a doubt that he would in many places have made his history more illuminating than it is. He often shows us that he was groping for light on geography that he could not find.

But if the passages above quoted from Prof. Brigham reveal the key-note of his paper from the point of view indicated they cannot be said to mark the real burden of the paper. That may rather be said to lie in the confession of deficiency on the part of the geographer, which may be pleaded in excuse even of the modern historian "skeptical of generalizations that are too easy and scorning overstatement" (p. 4), and in the

demand from the geographer for more definite and exact work where he is yet in arrears. "We still suffer," he says, "from a dearth of limited, local, special, and proven data, and a surplus of generalizations announced with the enthusiasm of a fresh discovery, or rediscovery, unsupported by adequate evidence" (p. 6). "We want narrower fields of investigation and better-proved results" (p. 20).

But with respect to this demand we will venture on one hint. In speaking of the race problem and the probable query of anthropologists thereon as to what right the geographer has there, he says (p. 14): "Here we seem at once to need a definition of geography. But the present writer will not try to go where angels have trod with devious and faltering steps. Some time we shall have a definition of geography, but not now." Why not? we would ask. We would rather appeal to him to reconsider this view, and to ask himself whether the papers in these two volumes that we have been considering would not in themselves afford the means of framing such a definition. "Why trouble about it, when no science has a fenced domain?" (p. 15). That no doubt is true in a sense, but it is an immense advantage for any science to be quite clear as to what it aims at. We know exactly what geology is, and that gives to its inquiries unmistakable direction and definiteness, which geography without a definition is apt to lack. How is it likely to solve questions with scientific precision if from lack of definition it is willing to face questions that cannot be stated with scientific precision? Prof. Brigham gently but justly gibes at the explanations that have been offered of the mental alertness which has been asserted to be the chief trait of the Japanese, but if the truth is, as one authority states (very credibly) that it is only some Japanese who are mentally alert, and that the great mass are very different, does that not make it a problem that the geographer as well as other people had better let alone? "Our goal," says Prof. Brigham, "is broad generalization" (p. 24), but on the nature of geographical generalization, from lack of a definition, he says nothing at all, and that is a problem too large to enter upon at the end of an article already perhaps too long.

To sum up, we think that from the examination just made of the papers printed in full in these two volumes we may take it that they tend to confirm what Mr. Whitbeck said in the paper quoted at the beginning of this article as to the general trend of geography in the United States, and that conclusion is strengthened by a consideration of the nature of the subjects of the papers of which we have only the titles or titles and brief abstracts. The great majority of these have a distinct reference to local influences on life and more particularly human life. And if we seek further confirmation of this tendency we may quote the following dictum by Prof. R. E. Dodge in his presidential address delivered before the Association of American geographers at the Washington meeting, December 1915: "Geography for secondary schools will in time be

geography—and geography is not a synonym for physical geography or commercial geography. Geography is a human as much as it is an earth science. Its larger problems are human problems that involve a study not only of the influencing conditions of the physical environment, but of the economic and social conditions that may be as basic as the physical conditions" (from the address as published in *School and Society*, The Science Press, New York, vol. 3, No. 60, p. 263).

NOTES ON THE CAMEROONS.

By a member of the West African Expeditionary Force.

CŒLUM non animum mutant, qui trans mare currunt. The truth of this saying is strongly impressed on the mind in the Cameroons. At Duala, the port, the European quarter was entirely German; no natives live in it; the houses are built of brick, faced with cement; they are comfortable, with gardens, and the factories or shops have up signs such as "Bäkerei," "Konditorei," etc. The roads are well metalled and mostly lined with shady trees. There is a large botanical garden, and a European hospital admirably equipped; cold storage, machine bakery, two hotels and a Biergarten. The Germans kept traps and ponies and some motors.

But where the European resemblance is strongest is at Buea, on the slope of the Cameroon Mountain, some 3000 feet above sea-level. This was the seat of Government and principal place of residence. The houses are well built, some of them with roses and creepers on the walls. Practically all have gardens full of roses. Government House is a magnificent establishment with terraces in front, each a rose garden, the main terrace having a fountain playing in the middle. The entrance hall is large, with a vast brick fireplace, mahogany panelling, and thick, heavy Persian carpet. The governor's own quarters were luxuriously furnished, and included a magnificent bath-room, with every kind of spray and shower bath. The kitchen was furnished with complete sets of every grade of cooking utensil and excellent china.

There is here a dairy farm, with pedigree cattle, producing milk, cream, cream cheese, Limburger, and butter, with a large number of carefully-bred pigs, all the animals being excellently cared for and housed. Vegetables are also to be had in plenty, and from Victoria, in Ambas Bay, the old English colony and port of Buea, there are to be obtained turtles, large prawns and excellent soles. At Victoria there is a fine specimen of German method and thoroughness. This is a beautifully laid-out botanical gardens, with broad, well-kept paths, every sort of tropical tree and plant being therein, all tabulated with metal labels. They were used also for experiments with coffee and other economic plants. The only remnant of

the original English occupation in Victoria is a magnificent avenue of huge mango trees, planted by British traders.

Victoria is connected with Buea by a light railway to Sopo, the military headquarters, about 1½ miles below Buea. Besides this small line there are two metre-gauge railways in the colony: the *Mittellandbahn* from Duala to Eseka, and thence towards Yaunde, Eseka being railhead at present, though the track to a point some 60 miles south of Yaunde is almost ready for the metals. This line runs due east from Duala into Central Cameroon. The second line, the *Kamerun Eisenbahn*, now called Cameroon Northern Railway, runs from Bonaberi, on the right bank of the Cameroon River opposite Duala, to Nkongsamba, some 100 miles inland and north of Duala. The Germans intended to push this line right through to Lake Chad, but there are no signs of any further working north of Nkongsamba. Both these railways were built at enormous expense, the bridges being excellent. On the Mittellandbahn at Edea, crossing the Sanaga River, is an iron bridge, the largest single span in Africa. On the Kamerun Eisenbahn there are several long iron bridges, the biggest being at Bepele and Kake.

The confidence of the Germans in their speedy return to occupation of the country was such that very little destruction was done to European property, only one small iron girder bridge being blown up on the Kamerun Eisenbahn and one span of a larger bridge outside Edea. The same consideration was not shown to natives, as villages were burnt and the inhabitants driven out, taken as carriers and killed wholesale. At Bare, 5 miles north of Nkongsamba, there was at one time a refugee camp of some 5000 natives who had sought British protection.

The roads in the country are good and well kept. From Duala to Yaunde there is a motor road, which proved very useful to the Allies' advance on that place, as carriers could be to a great extent replaced by motor transport. A large armoured car was also used. The road from Nkongsamba to Jang, also used by a column, was good but not fit for motor transport, the country being mountainous; but it was well built in that steep gradients were avoided. This road, according to German maps, would have been the future railway. There are many other second-class roads, but the two mentioned are the chief routes of trade in the colony.

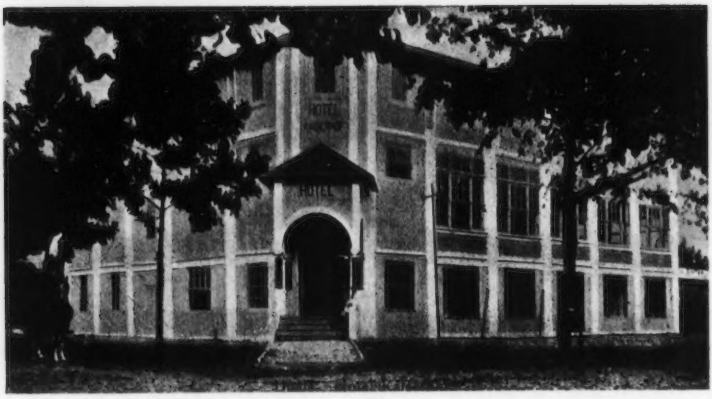
The District Headquarters, residences and official headquarters of the Provincial Commissioners (Bezirksmeister) appeared to be well chosen for position, and were certainly well built and well provided, notably at Yabassi, Bare, Joh. Albrechtshöhe and Jang, where they were all big well-furnished houses. Joh. Albrechtshöhe, west of about the centre of the Kamerun Eisenbahn, in particular has a fine situation on a hill overlooking a large lake, the Elefanten See.

The wealth of the country under the Germans was entirely agricultural. It would seem probable that there are minerals, in the north at any rate, to the same extent as in Northern Nigeria, but it is believed that no

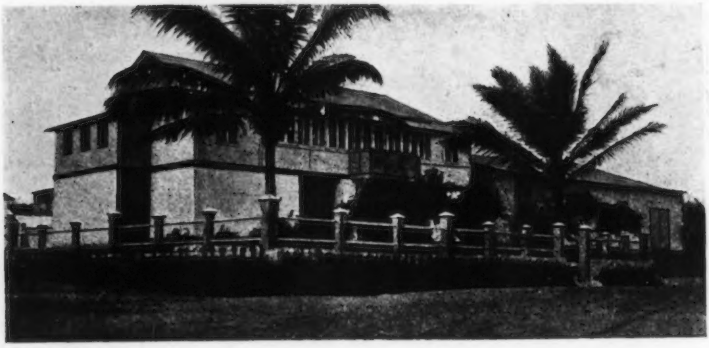
BUEA AND THE CAMEROON MOUNTAIN

THE GOVERNOR'S HOUSE, BUEA

THE DUALA DISPENSARY



THE HOTEL (LATE "KAISERHOF"), DUALA



FACTORY AT KRIBI

mineral survey had been made by the Government, as the policy was to develop the agricultural side first. The richest centre of agriculture is that around Victoria and Buea. Here there are huge and splendid plantations of cocoa, rubber, and palm. At Victoria there is a large machinery plant for cocoa and palm oil. Each plantation has very good European quarters; they are traversed by broad ways, mostly with light trolley lines down them. All down the coast to Spanish Muni there are plantations, and many inland, round Yaunde and other centres. A certain amount of teak was planted, while some ebony and much mahogany grows in the forests. This was exported, one ship taken by the Navy in Duala harbour having a full cargo of it, worth many thousands of pounds. It is, however, uncertain if these plantations will pay the British or French to work, as the German system of forced labour enabled them to work cheaply. A small amount of labour was used by the British in the Victoria district plantations by the employment of refugees from Kribi, a place on the coast south of Duala.

The inhabitants' extreme fear of remaining in a place in German hands was only too clearly shown at the evacuation of Kribi by the Allies. A huge refugee camp had been formed in Kribi, when it was decided that the place could be of no value in future military operations, whereupon all the natives begged to be taken away and remain under British protection. As far as the shipping allowed this was done, but necessarily many were left. The scene on the departure of the last steamer from Kribi was tragic, as many people, making frantic efforts to board the ship, were drowned by the swamping of canoes in the struggle.

That their fear of the Germans was justified has been amply proved by the official reports since drawn up, detailing atrocities of every sort practised by the enemy upon the helpless native inhabitants in all parts of the Cameroons during the campaign.

The Germans exported quantities of ivory, and in peace this industry could very well be carried on by the present occupiers of the territory. Apropos of ivory, it is amusing to note that during the fighting a small affair of patrols was interrupted and broken off through the intervention of a herd of elephants, both sides taking to flight. In the Victoria district there was an elephant of exceptional size and cunning, known to the Germans as the "100 Mark elephant." The German governor himself had at least on one occasion hunted this animal, employing a section of *Schutztruppen* to fire volleys.

Other products of the country that may be mentioned are coffee, bananas and plantains, sugar-cane, and Indian corn. The country swarms with animal life, as is generally the case on the West Coast. Elephants in large and numerous herds, leopards in the thick bush, monkeys of all descriptions, including large baboons in the impenetrable forest of the Yaunde district. In the grass country bush cow, bush pig, and many varieties of buck abound. There was a "Zoo" in the hospital grounds

in Duala, consisting of three or four duiker and other buck. The collection came to an untimely end, being privily removed and eaten by carriers! The skins of the specimens being found afterwards in a carrier camp, swift retribution overtook the devourers of the Cameroon Zoo.

The rivers are infested with crocodile and are full of fish, many of them quite good to eat; the usual method of fishing was the employment of a small cartridge of dynamite, tackle not being available. Nile perch was one of the few varieties recognized by the writer.

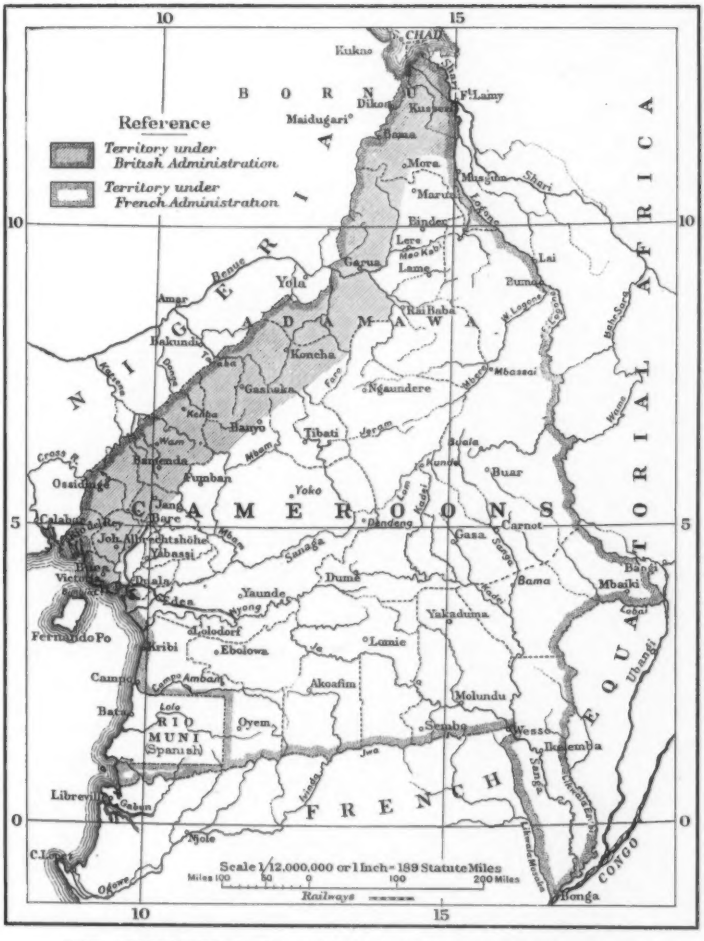
The climate varies enormously. Bonaberi on the right bank of the estuary of the Duala River has the usual West Coast port climate, damp heat and hot nights, whereas at Nkongsamba railhead two blankets are not too much at night, and in the wet season fires in the evening are quite welcome. Bare, being higher than Nkongsamba, is even cooler, and at Jang it is possible to sit out in the sun till 8 o'clock a.m. before the sun gets too hot.

Buea is, of course, also quite cool. Most of the houses have stoves in them; and in the wet season it has the disadvantage of an almost continuous wet thick mist, shutting out the magnificent view. Yaunde is also high and cool at night. With such variation of climate many widely different types of agriculture can be carried on in the country.

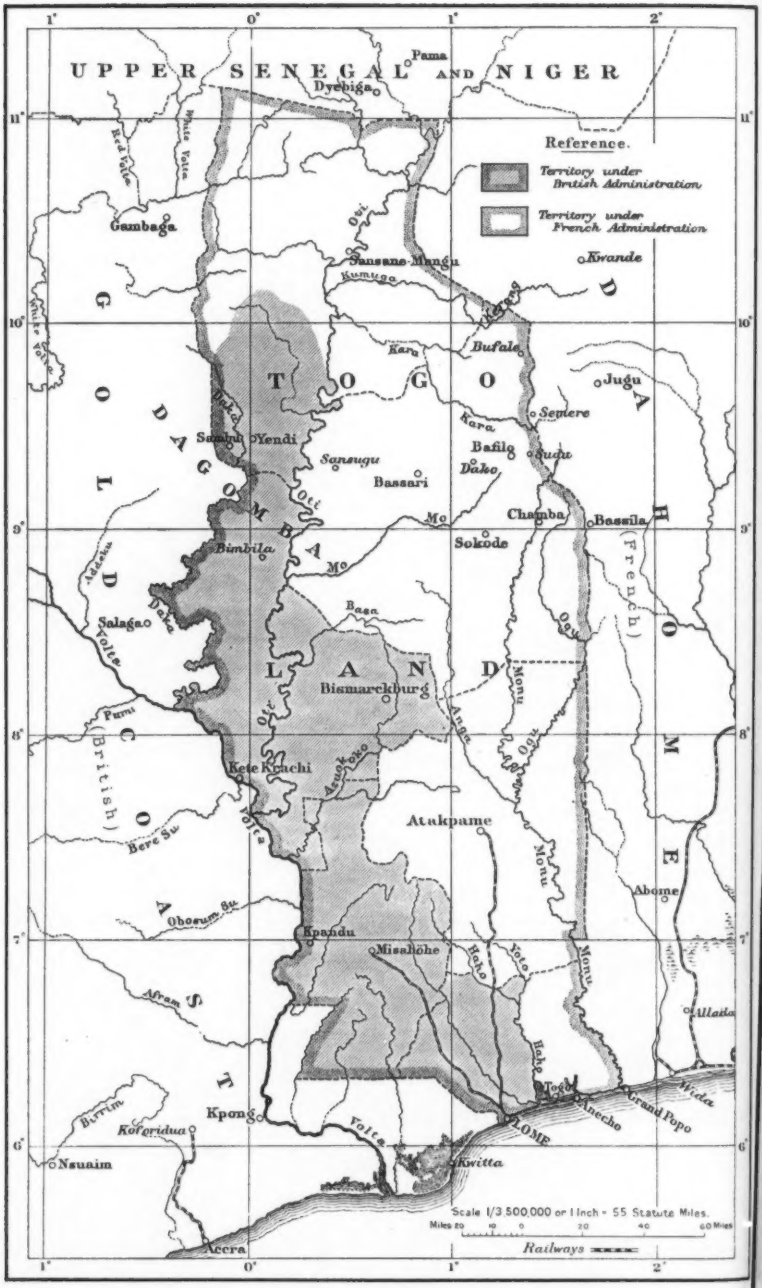
THE ADMINISTRATION OF THE CAMEROONS AND TOGOLAND.

WE are officially informed by the Colonial Office that the Cameroons have been provisionally divided between the French and British for administrative purposes until a final settlement can be reached on the conclusion of peace. The British sphere is being administered by the Government of Nigeria, and consists of:—

(1) The Victoria District north of the Bimbia Creek (except the extreme south-east corner).
(2) The Rio del Rey District.
(3) The Johann-Albrechtshöhe District.
(4) The Ossidinge District.
(5) The north-west half of the Jang District (including Jang).
(6) The Bamenda District.
(7) The north-west part of the Banyo District (including Gashaka and Koncha).
(8) The extreme south-west corner of the Garua District.
(9) The area in the extreme north of the Cameroons which was formerly part of the Native State of Bornu.



THE ADMINISTRATIVE DIVISION OF THE CAMEROONS. 1916



THE ADMINISTRATIVE DIVISION OF TOGOLAND. 1916

A similar division has been made in Togoland, of which the following districts are now under British administration:—

Lome-land, in which lies the port of Lome, Misahöhe, Kete-Krachi, and the part of the Mangu-Yendi district forming the Dagomba country.

This administrative division of the territories conquered by the Allied forces is represented approximately on the annexed maps, in which the boundaries as in 1914 of the then German colonies are shown by horizontal shading and the portions now administered by the British are shown by diagonal shading. These maps are not official, but have been constructed from the above official communication in accordance with the best information as to the district boundaries now at the disposal of the Society. No exact details as to the limits of the Dagomba country are available, and the division on the map has been left vague in this region.

NOTES ON THE NORTH-EASTERN DIVISION OF PAPUA (BRITISH NEW GUINEA).

W. M. Strong, M.A., M.D.

THESE notes and the map published foll. p. 448 are the outcome of a series of journeys made by me from 1908 to 1912, while I was medical officer to the Northern Division and Resident Magistrate for the North-Eastern Division of Papua.

The map is based primarily on fixed points determined by His Excellency Sir William Macgregor, and published by him in connection with a series of Government maps. Further secondary points were fixed by taking bearings with a 3-inch theodolite from these points. Rounds of angles and some of the more important secondary points were calculated, and other positions put in by cross-bearings. Further positions are from prismatic compass bearings. Heights are from theodolite vertical angles, boiling-point and aneroid readings, or are taken from the Government maps of Papua.

Actual route traverses and much of the coast-line have been put in from a passometer prismatic compass traverse, *i.e.* the general direction of the route was recorded in a field-book, and the number of recorded passometer paces while travelling in this direction was noted. The traverses were afterwards plotted off on squared paper.

In the more northerly part of the map Sir William Macgregor's fixed points have been combined with route traverses and determination of latitude and bearing with a 4-inch theodolite. The area of the map is contained between the main Owen Stanley range of mountains and the sea to the north-east of the range. The general direction of the range is north-west and south-east.

South of the eighth degree of south latitude there is a wide area of flat swampy country between the mountains of the main range and the coast, containing only a few hills of no great elevation. This flat swampy area is bounded on the south by Mount Lamington and the Hydrographers Range. The lower spurs of the Hydrographers Range reach the sea at Oro Bay, which marks the boundary of the North-Eastern and Kumusi divisions. This area is drained mainly by several rivers, which all run in a north-easterly direction from the main Owen Stanley range to the sea. The Waria, Gira, Mambare, Ope, and Kumusi are the chief of these.

From the head of Dyke Acland Bay to Cape Nelson the coast-line is also swampy, and swamps extend some way inland to the lower foothills. The northern part of the area is drained by the Barigi and Legara Rivers, which run into the sea close together at the head of Dyke Acland Bay. The lower part of the Legara at one part broadens out into an extensive shallow lake. On this lake a group of natives have constructed lake dwellings on piles, and until the Government assumed control of the district they seldom if ever came on dry land. They live almost entirely on fish and birds' eggs and sago together with native roots and bananas, which they mostly obtain by trading their fish with natives of villages on the Barigi River. Such natives are curiously affected by their semi-aquatic existence, being all flat-footed apparently as a result of their never walking on firm land. The more southern portion of this area is drained by the Musa River, which is formed by the union of several branches. Of these the Bari River runs in the first part of its course south and east, roughly parallel with the main range and through a broad open valley. Not far from Mount Suckling it joins the Adaua River; it then pierces a low rocky range by a gorge and changes its direction to run north and east. After running a few miles through rocky country it enters the low-lying flat and swampy plain and runs in a northerly direction to the sea, which it enters to the west of the Cape Nelson promontory. The Adaua branch of the Musa is remarkable in that it pierces the main range by a very narrow gorge between the Boroboro and Goidama hills. Above this there is a comparatively level valley in which is the village of Yakulume. Above this is another steep gorge, and above that the Keveri valley or district. The Keveri valley was opened up from the south coast years ago, and was for a time worked as an alluvial gold-field. It has been since abandoned, and when I visited it in 1910 no sign of the old occupation was left except rusting kerosene and meat tins on the site of the former store. In the Keveri Valley it is seen that the main range is to the north. The Adaua is therefore remarkable in that it really rises south of the main range, and pierces it to enter the sea on the north-east coast. This river is therefore older than the range, and must have flowed much in its present channel at a period anterior to the elevation of the main range. It is pretty clear that the main Owen Stanley Range is, geologically speaking, only of very recent elevation.

The Cape Nelson promontory is remarkable. It consists of a mass of hills ranging up to 5000 feet high. One of these is a still active volcano. I visited the upper slopes of it in 1911, and could quite clearly see steam rising from vents near the top. Reliable native accounts show that some forty years ago there was an extensive eruption—one or more villages were overwhelmed—and the Awanabairia people, who then lived on its slopes, fled to their present home at Lakwa. The coast-line of the peninsula is very rocky, with cliffs some 200 or 300 feet high, and is pierced by a series of fiords running 2 or 3 miles inland. The cliffs are almost vertical, with comparatively level tongues of land at the top. The fiords between these tongues of land are so deep that boats can with difficulty find an anchorage in them. I have never been able to decide if these fiords are formed by the subsidence of a former valley, or whether they have been formed by tongues of molten lava which have flowed out into deep water from the central volcanic mass. The cliffs are composed of a hardened volcanic conglomerate breccia. There are numerous reefs off this coast, and also in Collingwood Bay to the south. It is at Tufi on Cape Nelson that the headquarters of the Government for the North-Eastern Division is situated.

South of the Cape Nelson promontory, as far as Moibiri, the coast-line is again flat and swampy, but the high ranges of Uwowo, Goropu, and Maneao come within a few miles of the coast.

Maneao, a mountain 9137 feet high, was ascended without much difficulty in four and a half days from the coast. A start for the mountain was made by travelling a few miles up the Kwagila River to Waiuan village. During the rainy season the creek rises nearly every night and covers the village site with water, but goes down early next morning. A few hours inland from Waiaun the village of Moitu was reached. The Moitu natives knew of a track from here to the foot of the mountain, but nothing of the track beyond. However we were fortunate in getting on a leading spur, and four days after leaving Moitu reached the summit early in the afternoon. The mountain is covered with dense jungle up to 7000 feet. Our rate of progress was limited by the rate at which the road-cutters could make a way through the forest. It was only by having a double road-cutting gang, and by keeping one half of the gang always working, that we got up in the time. On the third day we camped in open country just over 7000 feet high. During the night a strong wind arose, and the coastal natives suffered much from cold. From 7000 feet to the summit the country was mainly open and heath-like. Just below the open country the shelters of some wandering party of native pig-hunters were seen. Tracks were seen right up to the top, possibly, however, only kangaroo tracks; but there is nothing to prevent the Aravi or other people from the south hunting right up to the summit.

South and east of Moibiri, at the head of Collingwood Bay, a large promontory juts out. On the south this promontory is bounded by

Goodenough Bay, and on the north by Collingwood Bay. The character of the country is here different from that in any other part of the district under consideration. It consists of dry and barren grassy hills intersected by valleys, carrying water in the rainy season. The hilltops are nearly all of about the same height, and, viewed from the sea a short distance out, the country looks almost like a plain, which appearance has given rise to its being described in some of the earlier maps as consisting of plains extending many miles inland. It is clearly a much-denuded peneplain. There are no rivers of any size in this area till we reach the Ruaba River near the head of Goodenough Bay. This river runs inland for some distance through comparatively flat country, but at the foot of the main range and at Binuwaga it approaches within a few miles of Wamusia. On reaching the Gwoira Range, the river is found to issue from the main range in two branches to the east of the Gwoira Mountain.

The rainy season lasts from about December to April, but varies somewhat in different parts of the district. In the greater part of the area rain may fall pretty well at any time throughout the year. The Cape Vogel promontory, however, is dry for seven or eight months in the year. At the Government station on Cape Nelson the annual rainfall averages nearly 300 inches. The heaviest fall occurs in the month of March, during the night. I have known as much as 13 and 14 inches to fall in one night, while falls of over 3 inches are quite common. These heavy rainfalls are influenced by the high land on the peninsula, and are probably very local. The temperature on Cape Nelson is remarkably constant. Day and night and throughout the year it seldom, if ever, goes below 77° or above 96°.

The native population is not dense, being estimated to be about 25,000. It is very varied. I have collected short vocabularies * of no less than thirty-four languages from the North-Eastern Division (between Oro Bay and the head of Goodenough Bay) alone, and I know this list is not exhaustive.

The coastal parts of the district and the flat country between the eighth parallel of latitude and Cape Nelson are peopled by allied natives, often called Benendela. They are more vigorous and courageous than most of the natives of Papua. The Hydrographers Range is peopled by quite a distinct type of native, about whom little is known. South of Cape Nelson the coastal natives, at least as far as language is concerned, consist largely of Melanesians, although there are signs of admixture with presumably indigenous Papuans. Inland from the head of Goodenough Bay and around the Gwoira Range a shorter and darker type of native is found; they are still very wild, and little is known of them. Even last year they killed and ate a European prospector. In former times the Benendela tribes were cannibals; the coastal natives around

* 'Papua: Report for the year ended 30th June 1911.' Printed and published by J. Kemp, Government Printer for the State of Victoria, Australia.

Collingwood Bay for the most part were not. Apart from the Gwoira district and the district inland from Mount Lamington, and perhaps a few isolated areas high up in the main range, the country is perfectly safe, and the natives very amenable to Government influence.

A census of some of the coastal villages was taken, and it was found that the number of men exceeded the number of women in the ratio of nearly four to three. It is possible that this may be due to the former prevalence of female infanticide.

CORAL REEFS AND THE ICE AGE.

The Glacial-Control Theory of Coral Reefs.— Reginald A. Daly. (*a*) *Am. Journ. Sci.*, vol. 30, pp. 297–308, 1910; (*b*) *Proc. Am. Ac. Arts and Sci.*, vol. 51, No. 4, November, pp. 157–251, 1915; (*c*) *Am. Journ. Sci.*, vol. 41, pp. 167–186, 1916.

THE elaborate and ingenious theory of coral reefs of which Prof. Daly is the author was suggested to him in the approved scientific manner that begins with the observation of facts. In 1909 he noticed the narrowness—and therefore the youthfulness—of the coral reefs fringing the Hawaiian Islands. Connecting this youthfulness with the discovery that a former glacier had left its traces on the flanks of Mauna Kea, he came to the conclusion that corals could not have flourished along the Hawaiian shores during the Glacial period, and that the existing reefs must have developed during post-Glacial time. An extension of the principle here involved to all the coral reefs of the Earth's surface led to the theory outlined below.

At the present time the range of temperature in the surface waters of the coral seas is from 23° C. to 29° C. according to the locality and the season. Remembering that 20° C. is the lower limit for coral growth, it is clear that a fall of a few degrees would in many places lead to the extinction of corals that now flourish vigorously. During the Glacial period, in which both hemispheres seem to have suffered roughly contemporaneous glaciation, the lowering of the snow-line amounted to 1000–2000 metres, and this fact, according to Daly's calculations, implies a fall of ocean temperatures near the surface of from 5° C. to 10° C. For this reason it is deduced that many pre-existing coral reefs were killed, leaving only a few sheltered spots where the uninterrupted propagation of corals could proceed, afterwards, when the rigour of climatic conditions had abated, to spread and colonize the shoals and platforms on which the active reefs of the present day are founded.

A second consequence of the Glacial period is no less significant for coral-reef theory. At the present time it is considered that existing ice-caps represent a transference of water from the oceans equivalent to a total

lowering of the surface by 11 to 37 metres. During the climax of glacial conditions the total lowering of the surface may have been 60 to 140 metres according to the assumptions made. Considering all the evidence Daly concludes that the ocean-level was then 50 to 60 metres lower than now on account of the removal of water to form ice-caps. In addition to this there may have been a gravitative withdrawal of water from tropical seas due to the attraction of ice-caps in high latitudes. This component of lowering is estimated as averaging 10 metres, giving a total of 60 to 70 metres at the time of maximum glaciation.

As a result of the lowered sea-level, and the lack of protecting rims of growing coral, pre-glacial islands and reefs would be steadily attacked by the waves, and in many cases reduced by marine abrasion to platforms a few metres below the sea-level of the period. It is not likely that abrasion proceeded to depths averaging much more than 20 metres below the lowered sea-level, and Daly suggests 40 metres as a maximum depth, giving as the maximum limits for the present depth of submarine platforms, 80 to 110 metres. According to Daly, and Vaughan (*Am. J. Sci.*, **41**, p. 131, 1916), and many of the earlier writers on coral reefs, Tyerman and Bennet, Wharton, Agassiz, and others, the problem to be solved is essentially the problem of the origin of the platforms. Vaughan, in particular, is convinced that the platforms antedate the development of reefs, and his work, together with that of Drew and Kellerman, has demonstrated the inability of solution as a means of developing the lagoons of barrier reefs and atolls. Daly has collected a large mass of statistical data bearing on the dimensions and depths of reef platforms, and from them he has drawn forty-three excellent sections of various types of reefs and lagoons. His figures illustrate the following generalizations :—

(*a*) Lagoon depths (both average and maximum) increase with the widths of the platforms ; that is to say, the post-glacial deposition of sedimentary veneer within the lagoons is greatest in the case of the smaller examples.

(*b*) Atoll and barrier lagoons of similar dimensions have depths of the same order (maxima 94 and 91 metres respectively).

(*c*) The lagoons of "drowned" atolls and the platforms of rimless banks are deeper than those of normal atolls, for where coral growth is restricted by climatic conditions, and so does not reach the surface ("drowned" atolls), or where corals have not gained a footing at all (rimless banks), the calcareous veneer of detritus is necessarily not so thick as when a vigorously growing reef surrounds the lagoon (maxima 110 and 128 metres).

(*d*) The general range of depths for the larger lagoons is from 60 to 90 metres.

(*e*) The coral-free portion of the shelf of the Great Barrier Reef of Australia, and many isolated banks outside the coral seas, have closely similar depths.

Remembering that the smaller lagoons are shallowed by deposition of coral detritus, the depths listed are of the same order as those computed for wave-formed benches formed during the Pleistocene. Day's theory thus withstands a searching statistical test, and his figures bring out the extraordinary flatness of lagoon floors; a feature that, combined with the general accordance of their depths, is considered (as it was by Wharton many years ago) to be fatal to the Darwin-Dana theory of subsidence. It must not be thought, however, that Daly ignores altogether the effects of earth movement, for in many districts, notably those of the south-western Pacific, subsidence and elevation are proved indubitably to have occurred. The statistical data in these cases show that—

(*a*) uplifted islands either lack submarine shelves, or have shelves at depths differing from those computed for Pleistocene wave-benching by the amount of uplift plus the thickness of sediment since deposited;

(*b*) subsided islands have shelves at correspondingly greater depths.

Having explained the origin of the platforms, their colonization by reef corals after the final Glacial climax and the upbuilding of the reefs are comparatively simple matters to understand. Known facts concerning the upward and lateral growth of corals, and the period elapsed since the withdrawal of glacial conditions, indicate that the corals have had ample time to keep pace with the rising sea-level, and when the present level was once attained to develop to their present dimensions. In short, Daly explains the growth of fringing and barrier reefs and atolls not by subsidence of oceanic islands, but by a gradual rise of sea-level as the ice stored up during the Pleistocene was slowly melted and liberated.

A number of objections to the glacial-control theory may now be briefly considered. It is generally accepted that the great ice-caps of the Pleistocene did not reach their climax simultaneously. Thus an element of doubt is introduced into Daly's estimate of the lowering of tropical sea-level, which should tend to be too high. However, against this it may be noticed that while the lowering may have been greater than 140 metres (if maximum glaciation was everywhere simultaneous) Daly assumes a depth of only 50 to 60 metres.

It has been argued by Gregory (*Nature*, 97, p. 191, 1916) that the submergence of Scandinavia, Britain, and Labrador, during the Glacial period, would also lower the sea-level. W. M. Davis, on the other hand (*Bull. Am. Geog. Soc.*, 46, p. 729, 1914), suggests that such submergence was presumably compensated by an uplift of the neighbouring sea-floor which would tend to raise the sea-level. Clearly, as Daly points out, the depression of these lands does not affect the order of magnitude of the amount of lowering of tropical sea-level assumed by him.

The glacial-control theory implies an abundance of drowned valleys along coasts which have not been glaciated or recently uplifted. The corresponding facts were realized in 1894 by Penck, who explained them by the melting of Pleistocene ice, in preference to assuming subsidence.

It remains true, of course, that vast lengths of coast show no sign of recent rise of sea-level (Gregory, *loc. cit.*), but surely this is largely due to the susceptibility of continents to isostatic uplift. Oceanic islands, on the contrary, are generally too small to be affected by isostatic movement, but such movement where it has taken place should generally be in the direction of subsidence.

W. M. Davis has discarded the glacial-control theory for two outstanding reasons of a topographic nature. First, he says (*Proc. Nat. Acad. of Sci.*, vol. I, p. 149, 1915), ". . . if the lagoons of large atolls have been abraded across their whole diameter of 20 or 30 miles, the central volcanic islands within narrow-lagoon barrier reefs should have been strongly cliffed by the lowered sea all round their shores," and continuing, he states that this is not the case. Daly admits that most of the cliffs are only a few metres in height, but he points out that if the sea-level were 55 metres below its present level, the cliffs then formed would have to be more than 55 metres in height in order that the upper parts of them should now be visible. Secondly, Davis, following Dana, regards the drowned erosion valleys of volcanic islands as proofs of subsidence, and shows that on the subsidence theory the still unsubmerged portions of the valleys should be of the one cycle type, while on the glacial-control theory the drowned valleys should generally be of the two cycle type, producing a valley-in-valley landscape. But, he says, "in the hundreds of embayments that I saw, no such composite valleys occurred." To this criticism, Daly replies that the physiographic development of volcanic islands is abnormal compared with the continental standard, and that even were an inner valley to have been formed, it is unlikely that the "edge," or break of slope produced by the revived streams, would have been preserved till the present day. "Post-Kansan time, favoured by the rapid rock-decay and heavy rains characteristic of the tropics, seems long enough to have largely or quite obliterated such minute features as these valley-in-valley 'edges.'"

The glacial-control theory seems to explain satisfactorily a number of features in the submarine topography of coral reefs that are difficult to understand on the subsidence theory of Darwin. Yet there remain certain areas, particularly the south-western Pacific, which are admittedly unstable, and in which Darwin's theory, slightly modified, is "sufficient to account for the reef phenomena" (Marshall, "Oceania," p. 7, 1912, in 'Handbuch der Regionalen Geologie'). Vaughan, though sympathetic towards Daly's views, and insisting on the priority of the platform, concludes that coral reefs depend on "some diastrophic change in the earth which has resulted in the sea overflowing the marginal land areas in geologically recent time."

There can be little doubt that controversy will rage for many years on the problem, or rather on the group of problems, presented by the origin of coral reefs, for at present the data are still insufficient to provide an

adequate basis for a complete explanation. Darwin's theory invokes widespread earth movements about which we still know very little. Daly's theory involves the Glacial period, as to the cause of which we are in total ignorance. Indeed, it is interesting to note that in a recent paper on the cause of the Ice Age (*Bull. Geol. Soc. Inst. Univ. Upsala*, vol. 13, i. 1916) Enquist suggests that the great extension of glaciated areas in the Pleistocene was due to a tectonic sinking of the level of the sea to the extent of 600 metres, and the puzzling features of coral reefs are brought forward to support the theory. Daly's cart is Enquist's horse, but as we do not really know which *is* cart and which its horse, it is impossible to decide which should come first in the links of causation, the Glacial period or the sinking of the seas.

In the present stage of investigation the only theories that call for serious discussion are Darwin's and Daly's. Neither holds the field completely, nor is it likely that they ever will do so, for it would seem wisest to regard them as complementary, each supplying, in any particular case, the defects or inadequacies of its partner. One should not omit to mention that the Glacial-control theory, independently of its truth or otherwise, is worthy of a hearty welcome as a stimulus to further researches. From the causes of the Ice Age, to the habits of reef-building corals, it arouses interest in a wide variety of problems whose solutions, one and all, lie in the future.

ARTHUR HOLMES.

THE INDO-RUSSIAN TRIANGULATION CONNECTION.

WE have lately received an important volume, 'Records of the Survey of India,' Vol. 6, prepared under the direction of Colonel Sir S. G. Burrard, Surveyor-General of India, and dealing with the completion of the link connecting the triangulations of India and Russia. The Indian Survey has done much splendid work, but none has been carried out under greater difficulties than this, and none is likely to be more valuable. It is the first step to the final solution of important geodetic problems.

During the International Geodetic Conference of 1909, which met in London, the question of a triangulation connection between India and Russia was discussed, and it was suggested that a link might be effected across the northern boundary ranges of India to the Chinese or Russian Pamirs. In the early part of the year 1911 the Surveyor-General of India received a proposal to this effect, and steps were at once taken to organize the work.

In 1909–1911 Gilgit had been connected with Rawul Pindi and the Indian system. In the mean time work on the Russian side, which had been initiated by Colonel Tcheikine, had reached the neighbourhood of

Pamirski port, about lat. 38° 13′, long. 75°. To the north-west of Kashmir, for a distance of about 160 miles between longitudes 72° and 75°, the British and Russian dominions are separated by a strip of Afghan territory not exceeding 40 miles in width. The connection of the Gilgit with the Russian survey, however, presented the most tremendous difficulties. The gigantic range of the Karakoram, with peaks ranging from 22,000–26,000 feet, with hardly any passes, and huge glaciers, filled nearly the whole of the ground that separated the Indian from the Russian survey. The difficulty of extending the Gilgit survey to the Afghan boundary was found to be insuperable. The only feasible route was from Gilgit up the Hunza valley to the Kilik Pass. This meant far more work, as the distance was greater; moreover, it meant surveying for over 100 miles up a narrow gorge such as can only be found in the Himalaya. The mountains on either side rise in precipices for thousands of feet. The bottom of the valley is seldom a mile wide, and in some places the path up the valley rests on pegs and props driven into the face of the cliff. The peaks on each side of the valley that had to be climbed in order to get stations were as a rule 6000–7000 feet above the valley, and were nearly all of them higher than Mont Blanc. The number of stations in the survey is thirty-three; their average height is 16,222 feet, the highest being 19,135 feet. Naturally such a survey entailed work of the most arduous kind, more often than not carried out under difficult conditions of wind and temperature.

A brief summary of the work has already been given by Lieut. Kenneth Mason, R.E., in the *Geographical Journal* (vol. 43, p. 664); this report of the Indian Survey gives the entire results of the expedition. During 1911 and 1912 Lieut. H. Bell, R.E., was in charge, and carried out all the reconnaissance. Only a few passes over the mountains were known, and some of these were inaccessible during the summer owing to rivers swollen with melted snow and unfordable; while beyond them ranges of peaks ("Glorified Matterhorns") entirely stopped further progress. According to Lieut. Bell they appeared inaccessible even to experienced climbers, and it was a physical impossibility to take an instrument up any one of them. It will be remembered that at the end of June 1912 Lieut. Bell was most unfortunately taken ill and died at Lup-Gaz, after having made his way to the termination of the Russian triangulation and met Colonel Tcheikine of the Russian Topographical Service. Early the next year 1913 Lieut. Mason took charge of the parties, and the connection of the English and Russian surveys was accomplished before the end of the year.

The report is full of interesting detail and makes excellent reading, especially the lively chapters contributed by Lieut. Mason, who went straight to the work from a holiday at Mürren, and tried his *ski* on the passes with some pleasure, but with "a fair number of tosses" and a descent of the Burzil which "left a lot to be desired." His chapter on Geographical Impressions of the Pamirs deserves careful study, and requires

for its full appreciation a better map than is contained in the report. His re-observation of marks placed by the Geological Survey on the snouts of certain glaciers shows the difficulties of satisfactory marking and the very valuable results to be obtained when these are overcome. He has also an interesting chapter on photographic surveying in the Pamirs. With Captain R. W. G. Hingston, I.M.S., he contributes a section on Geology and notes on the Climate and Snowfall. Messrs. V. D. B. Collins and C. S. McInnes describe the stretches of triangulation for which they were responsible.

Captain Hingston made a very complete zoological collection of the fauna of the Taghdumbash Pamir, and a series of observations of the cirrus clouds for the Meteorological Survey of India. A botanical collection was also made, but in such inhospitable wilds it necessarily was small and consisted of only forty-four species.

Captain Hingston's observations on the blood at high altitudes are particularly valuable, and the conclusions he draws from a large number of observations are given by quoting his words: "Increase in altitude means increase in the number of red blood-corpuscles. Normal blood at sea-level contains 5,000,000 red blood-corpuscles per cubic millimetre. During a gradual ascent the number increases until at an altitude of 18,203 feet, the highest point at which I was able to make an examination, the blood contains 8,320,000 corpuscles per cubic millimetre. The manufacture of these corpuscles takes time to develop, and failure in that development . . . means mountain sickness. The number of these red corpuscles in the blood of a dweller at low altitudes can increase until it reaches ultimately the number normal in the dwellers at high altitudes, and the converse is likewise true; and the method by which the body adapts itself to great heights is not by a greater energy on the part of the cardiac or respiratory mechanism, but by a slow and gradual manufacture of the red blood-cells which produce a greater richness of the blood stream and convey a normal supply of oxygen to all the tissues."

In the report are a number of excellent reproductions of photographs. They give a clear impression of the country, but they show it only in fine weather, and fine weather was the exception. Nearly half the days had seen snow falling to a greater or less extent. Naturally one of the greatest difficulties was the rationing the detachments. The Pamirs produce nothing except sheep and goats, and all the flour and other food had to be brought from Gilgit and Hunza; those only who have travelled in the desolate and rugged upper valleys of the Himalaya and Karakoram ranges will understand the immense amount of labour necessary. But in spite of this, in spite of the incessant climbing up and down the peaks from which the observations were to be made, waiting sometimes at the high camps on ice and snow for days till the weather was fine enough to allow angles to be taken, and in spite of numberless difficulties, the expedition was brought to a satisfactory end. Those who shared in the work are to

be congratulated, for not only have they completed a most important contribution to our knowledge of the mountain barrier that lies where "Three Empires meet," and connected two of these empires by survey, but they have also lived amongst some of the grandest scenery on the Earth's surface. In a letter from Captain Kingston to Lieut. Mason the former says, "I shall always look back on my experience on the Pamirs as one of the most fascinating of my life."

The report is dedicated by its authors to the memory of Lieut. Bell, who lies buried at Gilgit next to Hayward. His brother officers and his colleague Colonel Tcheikine bear touching reference to his high qualities of character and intellect. The Sarikolis at Lup Gaz, where he died, have named the valley Bell-Sahib-i-Jilga, and have built a shrine to the memory of the man they reverence for his just and kindly dealing.

J. N. C.

The technical results of the survey are described in three appendices, with a chart showing the figures of the triangulation, which has seven quadrilaterals, two tetragons with central points, and eleven single triangles, some of which can hardly be described as well conditioned, though they are far better than at one time seemed possible. Six-inch micrometer theodolites were used, generally with luminous signals. The mean triangular error of the whole series was $3''{\cdot}33$, and the mean error of an angle $\pm 2''{\cdot}79$. The Indian calculations are as usual based on the Everest spheroid.

It must be noticed that although a connection has now been made between Indian and Russian triangulation, the Russian work is at present not connected with the general triangulation of the Russian Empire. In an Appendix by General Pomerantsev it is explained that the Russian work starts from the town of Osh, where a base is measured, and proceeds by Lake Kara-Kul and the valley of the Aksu to the junction with India on the side Kukhtek–Sarblok, near which the chain is adjusted to a second base at Kisil-Rabat, where latitudes and azimuths were observed. The mean error of an angle of the Russian triangulation is $\pm 2''{\cdot}89$, and it is calculated upon the spheroid of Bessel. The side common to the Indian and Russian triangulations has a length of 7134 metres, and the discordance between the two values for this side is $1{\cdot}52$ metres. These results must be considered preliminary, and the whole will be recalculated when the Russian triangulation is joined to that of Tashkent.

Three peaks intersected from the new triangulation had been previously fixed by the Pamir Boundary Commission of 1895, and the agreement between the two sets of values is very striking. Commenting upon this in the Preface, Colonel Lenox-Conyngham remarks that the work of the Boundary Commission in 1895 was carried on by the approximate methods and expedients which rapidity of movement dictates, but that in skilled hands even these are capable of producing results of surprising accuracy,

so surprising as to have the appearance of lucky accidents were it not that the luck always seems to accompany those who know their art. It is possible that Colonel Wauhope and his colleagues on the Boundary Commission will be less surprised than Colonel Lenox-Conyngham at the excellence of this accordance, which suggests in fact that in course of time a connection will ultimately be established between the Indian and Russian Surveys by the method of re-section from visible but inaccessible peaks, stronger than is possible by the necessarily somewhat weak chain carried on stations which can be occupied in canonical form. It will be remembered also that in the recent work of the Peru–Bolivia Boundary Commission the triangulations north and south of the Cordillera were connected by re-sections with very satisfactory results.

A. R. H.

GEOGRAPHY AT THE BRITISH ASSOCIATION.

THE meeting of the British Association at Newcastle-on-Tyne was again held under war conditions, and, as was to be expected, the attendance was small. But it is questionable whether the quality of the work done in the various sections suffered much thereby. In Section E, at least, many interesting papers were read, and there were several good discussions. The Presidential chair was filled by Mr. E. A. Reeves. Sir Thomas Holdich, Dr. W. S. Bruce, Mr. Chisholm, and Prof. J. W. Gregory were Vice-presidents. Mr. J. McFarlane acted as Recorder, and Dr. R. N. Rudmose Brown, Mr. B. C. Wallis, and Mr. N. Shaw as Secretaries.

The President's address on "The Mapping of the Earth, Past, Present, and Future" was read at the opening meeting of the Section in the Friends' Meeting House on September 6. It is reported in full in the October number of the *Geographical Journal*.

Prof. H. J. Fleure followed with a paper entitled "France—a Regional Interpretation," in which he dealt with the wealth of the contributions made by France and her people to the heritage of civilization, and endeavoured to interpret this, not as the result of any presumed race-superiority, but as due to much more serious and substantial factors. France is in a sense a goal of many east to west routes in Europe. Across her also run almost the only practicable ways from north to south. These ways are fairly easily graded, and have time after time allowed waves of Mediterranean civilization to adjust themselves gradually to the conditions of the forest and corn lands further north. It has thus come to pass that Northern France has always had a good deal to link it with North Central Europe in peace and in war, while the south has remained essentially Roman in the foundation of its life. Burgundy and Aquitaine are, as it were, go-betweens, and their cities and traditions suggest this. But Aquitaine and Brittany make another contribution to civilization, for they with Ireland and the west of Britain retained the old Celtic-Ægean life of the Bronze Age for centuries after iron had spread into Europe, and their life has much that will be found to have been inherited from that Age. The author then proceeded to discuss the relations of the Paris Basin, the Rhône Corridor, Burgundy, Aquitaine, and other regions to one another, and their reactions one upon another, as shown in their language, the history of their law, their town-places, their cathedral

architecture, and the character of their thought. The general conclusion reached was that all the races and traditions which have attempted to influence Western Europe have met, clashed, and ultimately more or less fused in the Paris Basin, making that region extraordinarily rich from a human point of view. It is also so near the Mediterranean and so rich in itself that it has practically always been able to take up the enthusiasms and idealisms of the Mediterranean before they began to fade. It has thus acted as a great distributor of the more spiritual elements of civilization, and this indeed has been the great *rôle* not only of the Paris Basin but of the whole of France.

Generalization in Geography—especially in Human Geography—was the subject of a paper by Mr. G. G. Chisholm. It had, he said, been suggested to him by a statement in Prof. A. P. Brigham's presidential address to the Association of American Geographers that "our goal is broad generalization." But whether we look to physical or human geography, all the laws with which we have to deal are laws derived from other sciences or corollaries from such laws applied to the special conditions presented in Geography. In the case of human geography a distinction must be made between laws expressing influences acting upon man independently of his will, such for example as the influence of climate upon respiration, or on the degree of effort required to do work, and those relating to influences the operation of which is liable to be affected by the human will. Laws as to influence of this latter kind may indeed be valid, but only as expressive of tendencies which will be more or less pronounced in proportion to the imperiousness of the motive or motives assumed as acting on the will in the statement of such laws. Thus it may be possible to grow within this country all the rubber we require, but knowing what we do of the physical conditions demanded for the cultivation of rubber, and the motives that generally induce men to take up any branch of cultivation, we make no very hazardous statement when we say that we shall never grow in this country a single pound of the rubber which we require.

The afternoon sitting of the Section was devoted to a paper by Dr. W. S. Bruce on the Weddell Sea. After describing the physical conditions and rich animal life of that region, Dr. Bruce proceeded to discuss the history of its exploration. Recent researches which he had made had convinced him that the work of the earlier explorers such as Smith and Morrell had been greatly underrated by recent historians like Dr. Karl Fricker. They worked under infinitely less advantageous conditions than modern explorers do, both in regard to instruments and general scientific outfit, and in regard to personal comforts as well; and what they did under such conditions has never been properly recognized and has even been held subject to doubt.

On Thursday morning Sir Thomas Holdich opened a discussion on Political Boundaries. The best way to preserve peace among the nations, he maintained, was to part them by as strong and as definite a physical fence as could be found. A boundary must be a barrier, and its position must be influenced largely by the will of the people. These are the two governing conditions of boundary making. Concerning the latter all authorities seem to agree that the annexation of any territory against the will of its inhabitants is a political blunder. The assimilation of its people with the conquering nation is a slow and often an impossible process, and it is seldom that the acquired territory is a safe and thoroughly sound unit in the political entity. With regard to the boundary as a barrier, Sir Thomas Holdich took the view that it must be selected with the great object in view of hindering in every possible way any proposed scheme of violation. As a barrier it may be natural or it may be

artificial ; but in either case it must be made as secure as Nature and Art can make it, as in this imperfect world peace can only be based on security. Almost every geographical feature has already been impressed into the service of the boundary maker ; but mountain ranges are more valuable than any of the others. It is true that they have frequently been crossed by forces in the past ; but it is probable that the great development of scientific defence will render such feats difficult if not impossible in the future. Failing a definite uplifted watershed the ordinary divide between the heads of minor affluents of a river-basin is quite a useful alternative. Its advantages are those of permanence, definiteness, and economy, added to a certain command in altitude which renders it important as a military feature. Further, it is often unmistakably recognizable without the aid of artificial landmarks, which cost money and are perishable. It depends on the conditions of its environment whether a river makes a good boundary or a very bad one. Where the surrounding country is a waste of trackless forest or of wild upland, and where the river is confined to a narrow channel in a rock-bound bed, it may be admirably adapted for a boundary. On the other hand, when it leaves the hills and spreads into the plains, changing its banks and channels, swallowing up acres of good alluvial land in one place, and pushing up sandbanks and islands in another, it forms no boundary at all. Moreover, where it is broad enough and deep enough to warrant navigation it has a tendency to lapse into the exclusive possession of the most pushing nation. Rival claims for right of way and disputes about land or local irrigation are far more likely to arise from the common possession of an intermediate river than international amenities. When the Germans shifted their boundary from the Rhine to the Vosges Mountains they strengthened their own frontier greatly, while incidentally they also strengthened that of France. Of all frontiers, however, a wholly artificial one, such as a straight line, is the worst. It possesses no elasticity, it is often most difficult to determine, and it may cut in two local interests of great importance. A straight line is generally an indication of geographical ignorance, a last resource when topographical information is wanting, and it is therefore not surprising that in the past it has been distinctly popular. With regard to the future the speaker considered that there would be no great departure from selecting strong natural features as frontiers. The mountain ridge or the divide will be adopted wherever possible. The war has shown the enormous value to the defence of even a slight command in altitude. Where the dividing line is unsupported by strong geographical features the construction of fortresses will still be considered imperative.

Prof. L. W. Lyde had promised to follow Sir Thomas Holdich, but he was unfortunately prevented by illness from being present, and in his absence his paper was read by Mr. Wallis. In it Prof. Lyde contended that the principle of democracy was now sufficiently mature to demand that boundaries between nations should make for peace as well as for war. The two things were far from being the same. In the past political conditions had left only a choice of evils, and the lesser evil was to choose a feature which would minimize causes and chances of friction by preventing contact. But had not the time now come to adopt frontiers which combined different types of advantages and guaranteed peoples meeting easily in time of peace, and yet having a real security against attack in war? Such a frontier would not be merely a natural feature, enclosing and isolating a nation of recluses ; it would be essentially an international feature, effecting an equilibrium. It must therefore have geographical attributes which can serve political ends. It should be obvious and indisputable, if only to save the expense of demarcation ; and the history of the relations between New South

Wales and Victoria, or between Chile and Argentina, prove the difficulty and expense of obtaining such a line in mountainous country. For these reasons a river is much more suitable than a mountain range. It is a feature on and along which men do naturally congregate in peaceful occupations, and where even the most discordant elements can show only a minimum tendency towards discord. Indeed it is obviously the most important, the most universal, the most permanent of all such features. A navigable river is a feature encouraging a maximum of peaceful tendencies. With regard to security—the arguments advanced against rivers are not valid. The story of the commencement of the great Russian retreat is a catalogue of rivers from north to south: the Dubisa and Bobr, Bzura and Rawka, Dunajec and Biela; and the story of its conclusion is a similar catalogue: Sereth and Styr, Shchara and Nyemen, Viliya and Dvina. All things taken into consideration, it is possible that a railway-backed river is a stronger defensive position than any normal range that is crossable at all. Even if the mountain range is stronger it is not much stronger, while it is infinitely inferior to the river for all other practical purposes. The navigable river, indeed, is probably the most appropriate feature for a frontier. It is already a great commercial medium, adverse to isolation and exclusiveness, and favourable to the elimination of cultural and linguistic barriers between riparian peoples. Moreover, it is the easiest natural line of access inland for outside ideas, and along it international tendencies are relatively strong. The natural unity of the river valley, so far from being an objection, is a positive advantage; it is desirable that the two nations should be unified in all except political allegiance; the similarity of geographic control with the accompanying similarity of human development is a net advantage on the side of peace. Further, a political frontier is, after all, the embodiment of a formal contract, and such conception has much more force with the commercial community which is normal along a navigable river than with the nomad Highlanders who are the natural occupants of a mountain barrier. Another advantage of the navigable river is that it is able to provide an actual space boundary between the two nations on either side of it. The desirable "buffer" can be secured by making the fairway of the river international under an International Commission, national rights being only riparian. This would provide a neutral traffic zone, free to all alike, similar to those already established on land between France and Italy and between Mexico and the United States.

Before the discussion on these two papers took place Dr. Marion Newbigin read a paper (which has since been published in the *Scottish Geographical Magazine*) in which she stated the claims of Italy in regard to the Adriatic. In the subsequent discussion the President of the Association—Sir Arthur Evans—Mr. Chisholm, Prof. Gregory, and Mr. Reeves took part.

At the afternoon session the Rev. Walter Weston gave an account of his explorations in the Japanese Alps, which he illustrated with a remarkable series of lantern slides.

On Friday morning a joint meeting was held with Section C in the rooms of the latter, when Dr. A. Wilmore read a paper on the structure of the Northern Pennines, that part of the Pennine system between the Fyne Gap and the Craven or Aire Gap. Here the mountain masses are broader and higher and the structure is somewhat different from that of the Pennines south of the Craven Gap. The familiar anticline is not so conspicuously developed in the former region as in the latter. North of the Craven Gap—and stretching to the Fyne Gap—is the Plateau or Block Country, determined mainly by the three great fault-systems—the Pennine, the Dent, and the Craven Faults.

Three blocks of the Northern Pennines are thus formed: (1) the Cross Fell block, (2) the Mallerstang or Dent block, (3) the Ingleborough-Penygent block. The mountains which stand on these plateau-blocks are excellent examples of mountains of circumdenudation or residual mountains. Ingleborough or Penygent, which may be taken as a type, stands on the plateau-floor of the Great Scar Limestone, and is capped by outliers of Millstone Grit. The Great Scar Limestone is gradually replaced towards the north by the coming in of the Bernician type. In the Penygent block the limestone is a region famous for pot-holes and underground streams, such pot-holes as Gaping Ghyll and Alum Pot being well known. On the great plateau numerous streams disappear to reissue in the valleys below, frequently at the unconformity where the limestone, with or without its basement conglomerate, lies almost horizontally on the upturned edges of the older Palæozoic rocks.

These plateau blocks are not all similarly related to the adjacent westerly regions. On the east of the great Pennine Fault is the wedge-shaped Vale of Eden filled with Permian and Triassic strata. There is an interesting inlier chiefly of older Palæozoic rock between the Carboniferous plateau-blocks and the New Red beds of the plain. This is known as the Cross Fell inlier, and is characterized by a series of magnificent pikes. The Dent Fault has its downthrow to the east, and along the complex fault-line the Carboniferous Limestone is in contact with the older Palæozoic rocks of the Howgill Fells and the moors to the north and north-east of Kirby Lonsdale. To the east of this fault lies the Mallerstang block, which is remarkable for the great number of mountain masses between 2000 and 2400 feet in height. The Craven Fault system throws the Carboniferous Limestone, chiefly the Great Scar Limestone, against Permian or Coal Measures, or Millstone Grit, or the higher divisions of the Carboniferous Limestone itself.

To the geographer the changes of scenery in crossing these faults is most interesting. The view from the western limestone scars of the Cross Fell block across the Vale of Eden to the Lake District mountains is one of the finest in Britain. The change from the older Palæozoic Howgill Fells, Grayrigg Fells, Middleton and Barbon Fells eastward across Garsdale or Dentdale to the Carboniferous Fells of the Yoredale country of Mallerstang, is perhaps not so striking, but is very marked. The change from the Penygent block, with its great plateau floor, its step-like Yoredale mountains capped with grits, and its steep-sided gorges, to the rolling country of Bowland and the Craven Lowland provides one of the best geographical contrasts in the north of England.

The Section returned to their own rooms to listen to a paper by Captain Rodwell Jones on the evolution of the Port of Hull. In the earliest stage of its development Kingston was a tiny settlement where the Hull River afforded access and protection to small craft. At that time however it was of little importance, and Beverley was the real centre for the district. Later on it grew into a town, was walled and ditched, and engaged in a struggle for supremacy with Beverley. From this struggle it successfully emerged, mainly because of the growing importance of waterways. Roads were bad, and Kingston became the outlet for such agricultural centres in the surrounding district as Thorne and Snaith. The industrial development of the West Riding, which is based largely on its coalfields, led to a corresponding development in the port of Hull. The construction of canals considerably extended the hinterland of the port, and also led to the construction of docks, the earliest being converted from the old town ditch. Later on, when the tonnage of ships increased, the

advantage which Hull possessed in having a 30-foot channel at l.w.s. confirmed its position and contributed still further to its growth. The development of the modern port is due in no small measure to the growth of local industries, such as milling, seed crushing, and fish curing. The importance of the fishing industry, however, is not shown by statistics, as many trawlers belonging to the port send their fish direct to the Thames. Throughout this latter period the 30-foot channel has been of increasing importance, as it has rendered possible the adaptation of the port to modern overseas trade. Captain Jones's paper was illustrated by many slides showing the gradual development of Hull and its hinterland.

Mr. George Philip followed with "Suggestions for a new series of School Atlas Economic Maps." After emphasizing the importance of such a series as an aid to the study of commercial geography and indicating that their true function is to supplement and not to supersede the geographical text-book, Mr. Philip proceeded to explain the general principles on which he had constructed a large wall map of Eurasia. An endeavour had been made, he said, to show the state of commercial development actually attained by associating the distribution of the population with the character of its economic activities; the use of symbols or names for economic products had been avoided; the clearness of the map had been preserved by omitting all but the most important place-names, while the comparative values of the commercial factors were indicated by colouring; the great highways of commerce and the comparative value of sea-borne trade had been shown; and finally the relative commercial importance of the different countries of Eurasia had been illustrated. Mr. Philip's map aroused considerable interest, but unfortunately want of time rendered a discussion of its merits impossible.

Two papers by Dr. Jee were then read. In the first Dr. Jee dealt with annual variations in temperature and salinity of the waters of the English Channel. The annual temperature values on a section between Start Point and the Channel Islands rise from a minimum of 11°·27 in 1906 to a maximum of 12°·94 in 1913; the annual salinity values on the contrary fall from a maximum of 35·31 per mille in 1905 to a minimum of 34·89 per mille in 1912. The minimum monthly temperature values mainly conform to the law of odd and even, showing higher values in the sea temperatures at the epoch of minimal temperature in the years of even numbers than in the alternate years. This periodicity is not seen in the annual sea temperature means.

The monthly means of temperature and salinity conform to a simple sine law. On mean values the salinity is maximal in January, the temperature in August; conversely the salinity is minimal in July, the sea temperature in March.

The variations of the values of the salinity-ranges from season to season indicate periodicity, and a series of six alternately low and high salinity-range seasons, from 1905–6 to 1910–11 inclusive, appears to be sandwiched between similar series of very much higher salinity-range. In this series of six low-range salinity seasons a high minimal monthly sea temperature in the second year of the salinity season connotes a low seasonal salinity-range and conversely. It is therefore inferred that the strength of the Atlantic current, which maintains the salinity of the waters of the English Channel, is greater in these seasons in which the minimal monthly temperature is high and the salinity range low, than it is in the alternate seasons.

Dr. Jee's second paper was on the periodicity of sea-surface temperatures in the Atlantic Ocean. Throughout the years 1902 to 1915 inclusive during

the month of November the sea temperature in the eastern Atlantic along 50° N. lat., from the British coast to 35° W., varies without exception from a high value in an even-numbered year to a low value in the following odd-numbered year. The average sea-temperature difference between an even and odd numbered year was 0°·4 C. The extreme differences recorded between consecutive Novembers are 0°·65 and 0°·20. The observations refer to the surface layer of the sea, and the records are those collected by the Meteorological Office, London.

At the concluding meeting of the Section on Friday afternoon Mr. H. C. Woods gave an account of the port and town of Salonika and discussed its geographical relation to its hinterland. The town, he said, was in one sense completely materialistic and vulgar, while in another it had the appearance of a relic of the past. This was in part due to the unique composition of its population. Out of a total of about 125,000, approximately 75,000 were Jews. Besides these there were about 55,000 Doumes—a sect whose exact beliefs were not properly known, but from which the Young Turks recruited some of the ablest members of the Committee of Union and Progress. Mr. Woods, after describing in some detail the country round Salonika, went on to suggest the various routes and lines by which it was possible to push forward into the interior. Of these there were three, more or less distinct, viz. those which run in the direction of or *viâ* Monastir, those by or leading from the Vardar Valley, and those which connect the Ægean Plain with the interior of Bulgaria, the positions of which latter are governed by the all-important Rhodope Balkans. Unless they had been doubled by the Allies all the railways were single; most of the roads were out of repair, and many of the bridges were in bad condition.

The last paper to be read was by Mr. B. C. Wallis, in which he discussed the geographical aspects of a war indemnity. He argued that the enemy should not be so placed after peace terms are signed that he has the material advantages for commercial purposes, and he pointed out that German ships are shut up while British ones are being sunk or transformed; that German cotton factories are intact while those of Belgium are dismantled; and that German forests are conserved while those of Russia have been devastated. Mr. Wallis indicated the serious position in which our Allies would thus be placed on the resumption of peace, and suggested that all factories which had been destroyed by the Germans should be placed in working order either by the return of the machinery from Germany, or by the transference of machinery from German factories, or by the installation of new machinery provided by Germany. He also advocated that provision should be made for the payment in kind of any indemnity that might be imposed. Germany might be compelled, for example, to supply the Allied countries with Stassfurt salts for a definite period. In the discussion which followed considerable sympathy was expressed with the views put forward by Mr. Wallis.

J. McF.

REVIEWS.

EUROPE.

The Development of Transportation in Modern England.— W. T. Jackman, Lecturer in Political Economy in the University of Toronto. 2 vols.; xv. + 820 pp., six Maps. Cambridge: University Press. 1916. 24*s.* net.

MR. JACKMAN'S book is full of interest on all the main topics of his subject—roads, rivers, canals, railways, but it has little geographical background or

interest. It is, as its title suggests, essentially historical, and from that point of view is an admirable piece of work—scrupulously exact in statement and in reference (including a dozen very useful appendices and over sixty pages of bibliography), entirely devoid of prejudices, and never dull. It contains also innumerable hints that its author could give us a really valuable *geographical* study of the subject; but in the present work the geographical interest is entirely subordinate. For instance, it is obvious that there could be little demand for through inland traffic before the rise of foreign trade (*c.* 1750), and that the character of local traffic must have been influenced by local conditions. Mr. Jackman emphasizes the cheapness of transport for farm produce in early days in the eastern counties, and the relative goodness of the roads in Lancashire and Yorkshire, Staffordshire and Worcestershire, Somerset and Wiltshire; but, of course, the one was river-transport due to favourable relief, and the other was industrial traffic associated with hilly country. He explains how Dutch influence (as in Germany) affected the development of our inland waterways, but does not point out that Dutch lines of development (quite appropriate in Germany) did not suit the geographical conditions in England. He gives instances of canals, even in the 1750–1850 epoch, being rendered useless for weeks and even months by frost and lack of water; but he does not relate the fact to the climate—which is still substantially unchanged, although our demand for water, especially in our large cities, has been increased more than tenfold.

The same criticism would, of course, apply to all the numerous topics which he discusses—from the point of view deliberately adopted—with so much interest, fulness, and vividness. Thus, horse-owners opposed improvements in river navigation in one area; in another the destruction of the roads by narrow-wheeled stage-waggons carrying heavy goods led to the horse-owners demanding river-navigation for these heavy goods. The deballasting of barges in dry seasons at the shallowest reaches of rivers led to canalization, and the rising cost of the river led to canals pure and simple. These canals demanded supplementary and auxiliary railways, and both canal and rail were favoured by authorities responsible for the upkeep of roads, while the gradually rising cost of the canal favoured the further development of the railway. Eventually, the rivers, which in the earliest days had been safer than roads from "highwaymen," came to combine the advantages of all the other media. All this is to be found in Mr. Jackman's book, and one of its special merits is the detail with which he discusses, in the case of each medium, its special advantages and disadvantages, both expected and secured.

L. W. L.

My Holidays on Inland Waterways.— **P. Bonthron.** London: Thomas Murby & Co. 1916. Pp. x., 186. *Map and Illustrations.* 4*s.* 6*d. net.*

The sub-title of this book describes it as the record of "Two thousand miles cruising by motor-boat and pleasure skiff on the canals and rivers of Great Britain." The routes are plainly marked on a large folding map, and with the exception of those which cover the Caledonian, Crinan, Forth and Clyde, and Union Canals all lie south of the Humber. They are described in thirty short chapters based on articles published in the *Motor Boat* and other periodicals. Some of the cruises date back several years, and Mr. Bonthron warns any one who may be tempted to follow his example to make inquiries as to whether the waterways described are still open for navigation. The Thames and Severn Canal, for example, is now closed. There is still plenty of scope, however, for

holiday cruises such as Mr. Bonthron carried out, and it may be hoped that his book will be the means of inducing many to make acquaintance with the inland waterways of Great Britain. Usually, as he says, canals are left severely alone by the tourist; yet they are geographically interesting, and often they pass through very lovely country. After the account of each cruise a list is given of the number of miles travelled each day, with the number of locks, tunnels, etc.; and other practical information is provided.

The Slavs of the War Zone.— The Right Hon. W. F. Bailey, C.B. London: Chapman & Hall, Ltd. 1916. Pp. xii. and 266. *Map and Plates.* 10*s.* 6*d.* net.

This book consists of an Introduction which gives a general account of the distribution, numbers, and political position of the Slavs of Central Europe, followed by a series of sketches of life in the various Slav countries. Some of the sketches have already appeared in various periodicals, and while a proportion consist of vivid descriptions of scenes in town and country, others are descriptions, cast more or less in the form of fiction, of events immediately preceding the war or occurring during its progress. There are numerous photographs, which are often of considerable beauty but are not always strictly apposite to the text, and a sketch-map showing the distribution of nationalities in Central Europe, a map which we fear errs in simplifying too greatly a highly complex problem.

The following quotation from a description of the view from the Citadel Hill at Belgrade shows Mr. Bailey at his best: "Far below sparkle the great rivers which in early spring overflow their banks and cover like a vast grey sea the immense plain. When the floods have subsided the country which two months before was submerged becomes luxuriant with life and colour. There seems to be no limit to the horizon. Over the far-reaching Hungarian plains silence broods and fitful shadows chase each other. Like gigantic blue and silver ribbons the two streams flow between marshy banks fringed with rank grass, vividly-green rushes, osiers and wild flowers. Patches of forest and English-looking hedgerows here and there break the monotony."

There is a very interesting and detailed description of the ceremonies associated with the Serbian Christmas, which seem to have a marked pre-Christian element, being intended to ensure a bountiful harvest in the coming year. A curious point is the ceremonial drawing of the first water from the well on Christmas morning. This must be done by a young girl, who first throws a handful of corn and a sprig of basil into the well. This first-drawn water is used in the baking of a ceremonial cake, which is divided into as many pieces as there are members of the household, each piece being decorated with an agricultural symbol suited to the occupation of the individual receiving it.

The book does not profess to be a detailed scientific study of the different aspects of the Slav problem, and in the eyes of geographers there may seem to be a too great striving after pictorial effect, but it should help to increase public interest in this country in the Slav peoples and the manifold problems of their future.

M. I. N.

ASIA.

The Log-book of William Adams, 1614–19; with the Journal of Edward Saris, and other Documents. . . .— Edited, with Introduction and Notes, by **C. J. Purnell,** M.A. London: Reprinted from the *Transactions of the Japan*

Society of London, vol. 13. 1916. Pp. ix. (Index), 155–302. *Plates and two Facsimiles.*

Assuredly one of the most singular careers was that of "William Addames," Elizabethan shipwright and mariner, born in 1564 at Gillingham, Kent. The volume under notice provides a welcome supplement to the records of his life and doings already printed, with which geographers are familiar. One of the most surprising things about his career is, perhaps, that so much unimpeachable documentary history has come down to us concerning it. First apprenticed to a shipwright at Limehouse, Adams afterwards served as a master and pilot in Her Majesty's fleet, and at the time of the Spanish Armada commanded a victualler of 120 tons engaged in carrying supplies to Drake's squadron in the Channel. Next he sailed under the Company of Barbary Merchants, during some eleven years; but subsequently he went into Dutch employ, and piloted the one surviving ship of Jacques Mahu's squadron from the Texel to a haven in Japan.

It is with the logs that Adams kept when commanding a junk out of Hirado some years later, in the interests of the East India Company, that Mr. Purnell has chiefly concerned himself in the volume under notice. These logs have been skilfully, and one may believe laboriously, transcribed from the original seventy-nine leaves of Japanese paper on which Adams wrote them up from day to day, and which Sir Henry Savile bequeathed to the University of Oxford about the year 1687. Portions of two other journals, written by Edward Saris, who accompanied Adams as a supercargo in the junk *Sea Adventure* to Siam, and in the *Gift of God* to Cochin China, are appended, with divers letters and extracts; and a compendious account of all the subject-matter, put together by Mr. Purnell and read before a meeting of the Japan Society in London last year, forms an essential prelude to the present collection. All who have dipped into the history of early relations between Europeans and the nations of the Far East will find interesting material in this book.

Adams was a character, in his way: broad-minded in a general sense, and apparently so tolerant of opposition as to merit being thought slack—for a shipmaster. But he could not brook the designing wiles of the Jesuit missionaries, and flatly refused their approaches for the good of his soul. He became an adviser on certain subjects to the renowned Shōgun Iyéyasu, for whom he built two ships, and acted as interpreter and confidential agent when Dutch and Spanish ships visited Japan; the Shōgun granting him some signal favours, including a large demesne, with over a hundred vassals and farmsteads upon it, with reversion to his son by a Japanese wife. But the reader who is interested in Adams's life, and the circumstances attending these early visits to Japan, Liu-Kiu, and Siam, should turn to the pages of Mr. Purnell's book, and those of Mr. Arthur Diósy and Lord Redesdale (*Japan Soc. Trans.*, **6**, 325; **8**, 3). They are full of facts and references. The compositors and readers of the Eastern Press, Ltd., are to be praised for the accurate and clear manner in which these cumbrously spelt old records have been printed.

AFRICA.

A Woman in the Sahara.— **Helen C. Gordon.** London: William Heinemann. 1915. Pp. xiv., 354. *Illustrations.* 6*s. net.*

The Sahara of which Miss Gordon writes is the Algerian Sahara. The most southerly places which she visited were Ghardaia and Tuggurt. Her

book is the record of over a year's leisurely touring in 1912-13. The winter months were spent at a little town, famous among artists, which Miss Gordon has failed to name directly, but which may be identified as Bu Saada. From there she passed to Ghardaia *viâ* Jelfa and Laghuat; went north again for the summer to the mountains of the coastal region; turned eastwards in the autumn to visit Constantine; and from there in November journeyed south to Tuggurt. The new railway to Tuggurt was not then finished, but Miss Gordon obtained permission to travel on a goods train to the railhead at Jemaa.

From the geographical standpoint the book is a little disappointing. Though the chapters are arranged, for the most part, in chronological order, they provide not so much a continuous record of travel as a series of impressionist sketches, mainly dealing with scenes and incidents of native life. In the absence of a map the average reader will have some difficulty in following intelligently the author's movements. Probably, however, the book is not intended to do more than picture vividly the life of the desert and mountain villages in which its scenes are chiefly laid. This it succeeds in doing admirably. Miss Gordon has considerable graphic power as a writer and a strong dramatic sense—qualities which are in evidence all through the book, and which are supplemented by an active imagination in some of the chapters, relating little dramas of life and passion that came under her notice. A short but useful French bibliography is appended.

GENERAL.

The Statesman's Year-Book.— Edited by **J. Scott Keltie**, assisted by **M. Epstein.** London: Macmillan & Co. 1916. Pp. xliv., 1560. *Maps.* 10*s.* 6*d. net.*

In the preparation of the fifty-third annual publication of the 'Statesman's Year-Book' the editors have again been faced with the difficulties of obtaining up-to-date statistical and other information about most of the belligerent countries. More recent statistics than might be expected have been secured in some cases, notably in regard to Germany. Among Allied and neutral states, Japan and Spain have received special attention. The revision of the naval information for all countries has been carried out by Mr. John Leyland, who has taken the place in this respect of the late Mr. Fred T. Jane. Much valuable information is given in the "Introductory Tables." These include the terms of the Chino-Japanese Treaty signed at Peking in May last, which relates among other matters to the disposal of German rights in Kiao Chau and the province of Shantung; also the terms of the Treaty between the United States and Nicaragua, signed at Washington in August 1914 but not ratified until this year, reserving to the United States exclusive proprietary rights for the construction of any interoceanic canal across Nicaragua, and leasing to the United States certain islands, with the privilege of establishing a mainland naval base in Fonseca Bay. The chronological list of the principal events of the war is brought down to June 5, when Lord Kitchener was drowned; there are classified lists of the more important books on the war, supplementing those given last year; and interesting details are supplied of enemy war loans and the war finance of all the belligerents. The maps in this year's volume illustrate railway schemes in Asiatic Turkey, railway schemes in Africa, and the distribution of Germans throughout the world and in the United States in particular.

THE MONTHLY RECORD.

EUROPE.

Pirate Coasts of the Mediterranean.

MISS SEMPLE introduces a study of the geographical and other conditions which have fostered piracy in the Mediterranean from the earliest times (*Geogr. Review*, August 1916; a chapter from a forthcoming book on 'Geographic Influences in the Ancient Mediterranean Basin') with the remark that the submarine commerce-destroyers of the present war frequent the same hunting-grounds in the Mediterranean as the ancient and mediæval corsairs. The parallel is certainly interesting, though broadly to be accounted for by the simple fact that in a restricted basin commerce must follow more or less well-defined routes, which therefore impose equally definite spheres of operations on those who prey on it. The prevalence of piracy in the Mediterranean throughout the ages is the result of various other factors—some of them recognized so far back as Thucydides and Strabo—the general working of which Miss Semple sketches in her usual lucid way. Piracy, which has repeatedly broken out with new activity whenever maritime political control has been relaxed, has found in the Mediterranean certain coast districts which are natural breeding-places of sea-robbers, lying moreover conveniently near the main routes and converging-points of commerce, where booty could always be secured. By reason of the configuration of the surface the wealth of the bordering lands lay within easy reach of pillaging parties ashore, population being concentrated on the coastal hems and small deltaic plains. It was as a means of protection from such raids that the early settlements were formed some little distance inland, though often with a port on the actual coast. In southern Italy the effect of this retreat inland is still to be seen in the nearly depopulated seaboard, with unseen towns 3 to 10 miles inland, on acropolis sites in the mountains. The coasts that bred pirates show the same fundamental conditions that make for systematic robbery also in mountains and deserts—a poverty of resources, due to insufficient space for the development of cultivation or industries. Where such conditions prevailed, whether in islands, peninsulas, or continental shores, piracy was a natural product of the soil, as on the whole southern coast of Asia Minor; in many Ægean islands, and especially Crete; on the forbidding Caucasus coast of the Euxine; the Illyrian or Dalmatian coast of the Adriatic; the Atlas-walled Barbary coast; and in the Balearic Archipelago and Corsica. Most of these possess the special advantage of an abundance of lurking places for robber fleets, with headlands as outlook points and strongholds. Whilst thus a social economic effect of geographical conditions, piracy produced in turn important political effects. Pirate fleets, *e.g.*, were employed as mercenary navies. On the other hand the need imposed on the States assailed, of building up a strong standing navy, increased their maritime efficiency, whilst territorial expansion followed on the conquest of the lawless coasts for the purpose of policing them.

ASIA.

Dr. Carl Lumholtz in Central Borneo.

News has been received in this country from the Norwegian traveller Dr. Lumholtz, describing a successful journey through some of the less-known parts of Central Borneo, undertaken mainly for ethnological research. Dr. Lumholtz, whose previous work both in Australia and North America is well known to

geographers, had undertaken a new research expedition to New Guinea (towards the expenses of which a grant had been made by the Society's Council) before the outbreak of war, and had obtained promises of support from the Dutch Government in the East. The war made it impossible to carry out his plan, and he therefore decided to travel through Borneo, ascending the Barito river from the south coast, reaching the central watershed by way of its tributary the Busang, and following down the Mahakam river to the east coast. This programme was successfully accomplished, and Dr. Lumholtz made full use of the opportunity thus afforded of studying scientifically the little-touched native tribes of the central region. On leaving the steamer put at his disposal by the Dutch authorities he bought native boats, by means of which the formidable rapids of the Busang were overcome with considerable labour. Much of the country is uninhabited, but near the Müller mountains (so named in 1893-94 by Dr. Molengraaf in memory of the explorer Georg Müller, who lost his life here in 1826) natives were met with—a quiet hardy people of nomadic habits, who have been induced to settle down and cultivate rice. The country on the upper Busang is described as one in which silence and peace reign supreme, there being little animal life, no mosquitos, and consequently no malaria. The watershed was easily crossed at a height of 1400 feet into the country of the Saputans—a primitive but friendly people who one hundred years ago dwelt in caves. The region of the Upper Mahakam is inhabited by some ten thousand Dyaks of various tribes, much cut off from the outside world by the rapids lower down the Mahakam, and thus little touched by the influence of the Mohammedan Malays. They display a fine muscular development, and the women are well formed and graceful in their movements. The party had an exciting time descending the rapids of the Mahakam, the process being described as like tobogganing by water ; but it was accomplished in safety. Samarinda was reached on August 22 last. The Upper Mahakam country was first made known by the great expedition of Nieuwenhuis and Molengraaf in the nineties of last century, and something has since been done for the extension of Dutch influence. Even the region of the Busang (shown hypothetically only in Nieuwenhuis's map) is filled in in some detail in the latest Dutch maps, so that Dr. Lumholtz's expedition was hardly one of geographical discovery. He states however that his map will rectify the errors of previous cartographers, and that he has secured many photographs, cinematograph films, and anthropometric data.

AFRICA.

Possible Former Connection between Lake Chad and the Nile.

With reference to the correspondence on this subject in the October number, Mr. Harding King writes to point out that though his *map* in the *Journal* for September 1913 showed no connection between the Chad Bahr el Ghazal and the Wadi el Fardi, the text of his article expressly stated (p. 281) that the Wadi el Fardi is "another name for the Wadi Tibbu or Bahr el Ghazal." He has since looked up his original notes and sends us a copy of them so far as they bear on this point, showing that as taken down from his informant the statement as to the Wadi el Fardi being a *continuation* of the Bahr el Ghazel was even more explicit than it appeared in his article. He adds, "I cannot now remember why I left out the alternative names from my map. But I rejected some of the information I collected, as it seemed to me unsound ; and as I had not then heard the theory that the Bahr el Ghazal was an effluent of the Chad, I suppose that the connection between it and the Wadi el Fardi

seemed to me improbable, so I only briefly mentioned it in the paper, omitting it from the map altogether." It may be noted that in the English edition of Barth's 'Travels' (vol. 3, pp. 587–8) that traveller expresses no personal view on the subject, whereas in the German edition as quoted by Nachtigal (vol. 2, p. 116) he adds the strong comment that the native story was "mehr als apocryphisch und gar nicht denkbar. . . ." It is uncertain whether or not this represents his final view, as the German edition seems to have come out almost simultaneously with the English. No doubt the balance of evidence now favours the idea that the Bahr el Ghazal has a fall *away* from Lake Chad; but even so its connection with the Nile by way of the Libyan Desert will need further proof than has yet been given.

AMERICA.

The United States Geological Survey.

The latest Annual Report (1914–15) of this survey calls attention to the various ways in which the public utility of its work has been increased within the last decade. As is well known the scope of its activities has always been wider than its title might suggest, as it has been responsible for the topographical basis of the maps issued, and thus discharges the function of our own Ordnance Survey in addition to its more special concern with the geology. Of late years it has carried out extensive and valuable labours in regard to the hydrology, both above and below ground, and quite a large proportion of its publications deal with this part of its work under the title "Water-supply and Irrigation Papers." Much of its work, again, consists in the supply of information to correspondents, some fifty thousand letters being dealt with by its various branches in the course of the year. Some of these were even concerned with the natural resources of countries outside the United States. The present world-war has brought into prominence that part of its work which is concerned with mineral products, the sudden closing of many sources of supply eliciting many inquiries as to possible new sources, and these were dealt with not only by correspondence but by the issue of special bulletins. In one of these, entitled "Our Mineral Reserves," a valuable summary was given of the capacity of the United States to meet the emergency demands for minerals of various kinds. The duty of the survey to furnish popular information of an instructive type is being more fully recognized, and care is now taken so to simplify the language of the publications as to make them more generally serviceable and fulfil an educational obligation to the public. On various maps lately issued a non-technical description of the physical features of the area concerned and their origin has been printed on the back, and the public appreciation of this has been evidenced by increased sales. Guides to areas of scientific and special geological interest have been prepared, and a more ambitious project has been initiated in the preparation of a series of guides to some of the principal routes used by tourists, with a view to enabling them to grasp intelligently the true nature and meaning of the country traversed. Four such guides were issued in connection with the Pacific Exposition, describing the main routes to the great west, and the features and resources of the regions served by them. The normal work of the survey has of course been in constant progress, more than 76,000 square miles being covered by the geologists in reconnaissance and detailed surveys, and more than 35,000 square miles mapped by the topographers during the year. Stream measurements were made in forty-one states and in Hawaii. The maps indicating the position of the surveys on 1 July 1915 show that a large proportion of the whole area is

still unsurveyed topographically even on the scale of 1 : 250,000. The greatest progress has been made in a broad belt running across the States from Boston to San Francisco, while large areas in the north and north-west, south and south-east, are still little touched.

Dr. Farabee's Researches in South America.

Dr. Farabee, whose ethnological researches in the basin of the Amazon and other parts of South America have several times been mentioned in the *Journal* (see especially vol. 44, p. 101 ; 46, p. 475), has this year returned to the United States after satisfactorily completing his labours. Although not primarily undertaken with a geographical object, they have some interest from this point of view. In a letter received from him at the Society he states that in three different places during his search for new tribes of Indians he travelled where white men had not been before. The first was in the tract between the Xingu and Tapajos (southern tributaries of the Amazon) in about 7° S. lat.* Here Dr. Farabee found a semi-desert area, with a few scrubby trees and some grass in the lowlands. Evidences of the emu were seen, indicating that this is the northern extension of the grassy plateau of Central Brazil. Secondly, in the northern corner of Brazil near the Venezuelan border Dr. Farabee ascended the Ucaraca River a few days further than it had previously been known, getting beyond the campo country into a region unoccupied by Indians. The river was too rapid for navigation, so a return was made by the same route. The third area was the most important for the extent of new ground traversed, lying on the borders of Brazil and British Guiana. Dr. Farabee went further south than Schomburgk, then east and north to his trail, and down a different branch of the Corentyn River, and on to its mouth. He has not yet been able to work out his observations for mapping purposes, but hopes to do so in time.

AUSTRALASIA AND PACIFIC ISLANDS.

Climatic Control of Australian Production.

In a memoir constituting *Bulletin* No. 11 of the Commonwealth Bureau of Meteorology Mr. Griffith Taylor attempts to correlate the all-important factor of climate with the three great agricultural and pastoral products of cattle, sheep, and wheat, showing in a series of maps for the several States, and for the Commonwealth as a whole, the distribution of these commodities during the year 1912. The comparison of such distribution with average climatic conditions shows the chief physical control to be that of rainfall, which affects absolutely the distribution of wheat, and very materially that of cattle and sheep. Although no cattle and sheep are found in the desert regions of Australia, the flocks and herds are highly adaptable to varying conditions of rainfall, ranging from regions with 60 inches of rain per annum to those with 6. Nevertheless the rainfall is seen to define with considerable accuracy those districts where the pastoral industry flourishes best, and the maps, moreover, also show that the same isohyets do not affect cattle and sheep equally. In the case of two of the industries, sheep and wheat, the temperature factor is very important. Thus while cattle are almost ubiquitous even in the far north, the region of tropical vegetation is less suitable to sheep than the cooler and drier areas to the south, and the northern limits of the wheat belts are undoubtedly controlled by the increase of temperature. The greatest number of cattle, 10 per square mile, are reared in the eastern coastal

* This is just further south than the most southerly part of Miss Snethlage's traverse between the two rivers (*Journal*, vol. 44, p. 100).

belt of Australia, outside the 20-inch isohyet. If one assumes that the newer northern and western regions will progress along similar lines in the future, then a glance at the rainfall map of Australia suggests that the chief advance will be made in Kimberley (Western Australia) and in the Northern Territory Taking the continent as a whole, it is only in the tropical parts that any large expansion of the cattle industry may be looked for as being more profitable than that of sheep. While the cattle occupy the wetter coastal regions the sheep thrive best in the drier inland belt, and in general an important sheep country is not noted for cattle, and *vice versâ*, except in parts of Victoria where the two industries are intermingled. In the Queensland tropics the best rainfall for sheep appears to be from 15 to 20 inches. The greatest number of sheep per square mile, 100, are to be found in the drier inland belt of Victoria and New South Wales, and also in that part of Queensland where, as just stated, the rainfall is favourable. The region in the south-west of Western Australia known as "Swanland" is analogous in climatic and other conditions to the important sheep country of New South Wales; and it is here accordingly that the chief development of the industry may be anticipated. As regards wheat, the greatest output, over 100 bushels per sq. mile, is in the extreme south of the continent, more especially the south-east. Mr. Taylor produces statistics regarding the most favourable conditions of temperature and rainfall during the wheat-growing period (April to October) in the several Australian States, and also investigates the general problem of wheat cultivation in other parts of the world as compared with Australia. Regions which are climatically suitable for wheat production but not yet exploited are: that of north-east of Albany in Western Australia, the northern portion of Eyre peninsula in South Australia, the northern fringe of the wheat area of New South Wales from Coonamble to the Queensland border, and the south-eastern portion of Queensland; all of these except the last being normal extensions of well-known wheat areas. As regards the future, it is from Queensland that the chief increase in wheat production is to be expected. It is pointed out that climatic conditions in northern India and in east-central Queensland are closely similar, a fact which warrants a careful study of wheat culture in the two regions in relation to the production of most suitable varieties.

POLAR REGIONS.

Nicholas II. Land.

The Russian Minister for Foreign Affairs has formally notified to foreign governments the incorporation in the Russian Empire of the new land north of Siberia discovered by Captain Vilkitski (*Journal*, vol. 42, p. 469), to which the above name has been officially given.

Mr. Rasmussen in West Greenland.

In the *Journal* for April 1916 (p. 315) we mentioned Mr. Rasmussen's plans for a new expedition to North Greenland, in which he hoped to repeat his former traverse of the inland ice to Peary Land and explore the isthmus connecting this with the mainland. News has now been received that he was unable, on account of the state of the ice, to reach his station at Thule in time to carry out this journey, and he therefore took up the alternative plan formed in anticipation of such an eventuality, viz. that of a thorough exploration of the coast of Melville Bay, between the Upernivik and Cape York districts, from the point of view of cartography, botany, zoology, ethnography, and archæology. Writing to us before starting, he pointed out that this region had not yet been scientifically investigated, but that it presented problems of peculiar interest through

its position between the Danish settlements and the Cape York district. He anticipated gaining valuable information on the old Eskimo migrations, since these people *must* have passed this way to reach what is now Danish West Greenland, while the fact that the coast country has remained uninhabited throughout the whole period of Danish colonization appeared to justify the expectation that remains of houses might be found of pure Eskimo form, untouched by later European influence. He hoped also to study the great glaciers of this region, as to which no detailed information has so far been available. The results of this summer's work should therefore be of much interest. We understand that Mr. Rasmussen will next year take up his larger project for a journey from east to west across the Arctic Archipelago, with a view to the study of past Eskimo migrations.

The Shackleton Expedition.

After the rescue of his men from Elephant Island Sir E. Shackleton accompanied the *Yelcho* back to Chile, in order personally to thank the Chilean Government for its generous action in providing the rescue ship. He met with an enthusiastic reception, as also on a subsequent visit to Buenos Aires and Monte Video. He will not return to this country in the *Discovery*, which is now on her way back from Monte Video, but will proceed direct from South America to New Zealand to join the expedition fitted out for the relief of the Ross Island party. The *Aurora* will sail for the Ross Sea with this object in December, under the command of Captain J. K. Davis, who has been appointed on the recommendation of the Australasian Committee responsible for the fitting out of the expedition.

GENERAL.

London University Diploma in Geography.

Enlightened action has lately been taken by the University of London in the institution of a Diploma in Geography, which it is hoped will take a recognized place as marking a high standard of knowledge in the subject, being regarded as equivalent to an Honours degree in one subject. The first examination was held in July of this year, four candidates offering themselves, all of whom passed. It is laid down that all candidates must have attended a course of study approved by the university, such course being open to Matriculated Students of the University and Graduates of other approved universities, who give evidence of sufficient knowledge of geography to profit by the course. Especial stress is laid on the physical basis of geography, which is taken to include the elements of physical geology, geomorphology, and meteorology. The examination will also test the knowledge of the candidates in the use of instruments and in map-making and reading, as well as in general, regional, and historical geography. The courses of study at University College in the several branches are under the capable direction of Prof. Garwood, Prof. Lyde, and Mr. Ormsby (Reader in Surveying). This new recognition of geography as a subject worthy of higher university study is a welcome encouragement to those who have long worked in this direction.

Gilchrist Studentship in Geography.

It is announced that the next election to this Studentship will take place in February 1917, and that all applications must be sent in before January 25 to Prof. L. W. Lyde, University College, Gower Street, London, W.C. It will be remembered that the Studentship was founded by the Gilchrist Trustees with a

view to the improvement of geographical teaching by giving an opportunity of further geographical study to the teacher who seems likely to make the best use of such opportunity. The rules and conditions were printed in the *Journal* in 1912 (vol. 39, p. 164). The value of the Studentship now offered will be £80.

OBITUARY.

Captain Samuel Bartlett.

WITH much regret we record the death of the well-known ice-navigator, Captain Samuel W. Bartlett, which occurred at his home at Brigus, Newfoundland, on September 9. Captain Bartlett belonged to a famous family of Newfoundland sailing-masters, which has long been identified with Arctic exploration and enterprise to the north of America, and has made a name for the sterling qualities of its members. He represented the middle generation of three which have been connected with Arctic discovery, and was especially associated with Peary's successive efforts to reach the North Pole, having commanded in turn the *Diana* (1899), the *Windward* (1900–1901), the *Erik* (1905 and 1908), and the *Jeanie* (1909). In 1903–04 he was master of the Canadian Government steamer *Neptune* during her cruise to Hudson Bay and the Arctic Archipelago under the command of Mr. A. P. Low. He was brother of Captain John Bartlett, who so far back as 1869 was master of the *Panther*—the steam-yacht in which Hayes and Bradford visited Melville Bay in that year *—and was also associated with Peary's Arctic explorations; and uncle to Captain Robert Bartlett, who took a prominent part in Peary's later expeditions, and afterwards commanded Mr. Stefánsson's ship the *Karluk*. All who knew "Captain Sam" spoke in ungrudging terms of his unrivalled professional capabilities, and of those other high qualities of staunchness and loyalty which gained him the affectionate regard of his associates.

Count Samuel Teleki.

The Hungarian traveller Count Teleki, whose death occurred in March last, has won a permanent place in the roll of African explorers in virtue of his expedition of 1886–89, during which Lake Rudolf, fourth in size of the great lakes of Equatorial Africa, was for the first time sighted by white men. The existence of a great lake in the unknown area between the Victoria Nyanza and Abyssinia had for some years been rumoured, and after the route in this direction had been opened up by Joseph Thomson's great journey through Masailand its discovery offered one of the most alluring tasks for the African explorer. Count Teleki was the first to take advantage of this open road, and, accompanied by Lieut. Von Höhnel, not only made his way to the lake but traced it to its northern extremity, and also visited the smaller Lake Stephanie to the north-east, bringing back valuable observations on the geography, geology, and ethnology of the country traversed. By nature a keen traveller, the Count made various subsequent journeys in Africa and the East, many of them for purposes of sport and natural history, but resulting in no further geographical discovery. A warm appreciation of Count Teleki, both as a

* Peary speaks of Samuel Bartlett as master, and of John Bartlett as mate of the *Panther*, but Hayes's narrative ('The Land of Desolation,' 1871) assigns the command to John Bartlett, of whose qualities he expresses a high opinion.

traveller and a congenial companion, is given by his quondam associate Von Höhnel in *Petermanns Mitteilungen* for May last. He was born at Saromberke in Eastern Siebenbürgen—the ancestral home of his family—in 1845.

CORRESPONDENCE.

Glacial Phenomena on the Yun-nan–Tibet Frontier.

MAY I correct a misapprehension in the remarks of Dr. J. W. Evans and the President with reference to my paper, "Glacial Phenomena on the Yun-nan–Tibet Frontier," printed in the July number of the *Journal*? Both understood me to mean that I consider the western ranges to have risen appreciably during the last half-century, and that immediately prior to that the eastern ranges were glaciated.

This is, I imagine, owing to my ambiguous quoting of the Tibetans, who said that fifty years ago the Ka-gur-pu glacier extended further down the valley. Personally I attach little importance to that evidence, though it may perhaps show that this glacier has retreated appreciably during that period. In another paper, to be published at Edinburgh, I have endeavoured to show that the marked differences between the flora of the Mekong–Yangtze divide and that of the Salween–Irrawaddy divide are due to the retreat of the ice from the former range; but such differences could not have been brought about in a few years. Moreover, the glaciers of the Mekong–Yangtze divide are so reduced, and the records of them have been so far demolished and masked, that they must have disappeared long ago. Prof. Gregory states my case when he suggests that I mean that there has been a slow retreat, at least on the Mekong–Yangtze divide, since prehistoric times. Undoubtedly the glaciers are retreating now, but a temporary advance might set in again if for any reason the rainfall temporarily increased. While believing that the western range may still be rising, I have no reason to believe that the rise is appreciable in fifty years; the effect of a slight elevation might not be appreciable for some time.

F. KINGDON WARD, 2nd Lieut., R.O.I.A.

Bhamo, Upper Burma,
9 September 1916.

GEOGRAPHICAL LITERATURE: ADDITIONS TO THE LIBRARY. Edward Heawood, Librarian, R.G.S.

For list of abbreviations see January number.

EUROPE.

Alps. **Durham.**

Summer holidays in the Alps, 1898–1914. By W. E. Durham. London: T. Fisher Unwin, [1916]. Size 10¼ × 7, pp. 208. *Illustrations. Price* 15*s. net. Presented.*

Eastern Europe—Slavs.

The Southern Slav Library: V. Idea of Southern Slav Unity. Published on behalf of the Jugoslav Committee in London, 1916. Size 7½ × 5, pp. 36. *Price* 3*d. Presented.*

Europe—Political. **Seton-Watson.**

German, Slav, and Magyar. A study in the origins of the great war. By Dr. R. W. Seton-Watson. London: Williams & Norgate, 1916. Size 7½ × 5, pp. 198. *Sketch-maps. Price* 2*s.* 6*d. net. Presented.*

A clear exposition of the recent political history of the countries of Central and South-Eastern Europe in its bearings on the present conflict. As in previous writings, Dr. Seton-Watson is a warm champion of the "Southern Slav" cause.

Holland—Economic. **Brander.**

Economische Aardrijkskunde. Nederlands Welvaren. Door J. Brander. Rotterdam, N.D. Size 8½ × 5½, pp. 216. *Map. Price fr.* 1.75.

Deals with communications, industries, trade, etc.

Italy—Apulia—Population. **Colamonico.**

B.R.S.G. (*Rome*), Serie V., 5 (1916): 201–234, 274–305, 403–429.

La distribuzione della popolazione nella Puglia centrale e meridionale secondo la natura geologica del suolo. By Carmelo Colamonico. *Maps and Illustrations.*

Italy—Friuli—Speleology. **Gasperi.**

Mem. G., suppl. Riv. G. Italiana 10 (1916): pp. 219.

Materiali per lo studio dei fenomeni carsici. II. Grotte e voragini del Friuli. By G. B. de Gasperi. *Plans and Illustrations.*

Italy—Islands. *B.R.S.G.* (*Rome*), Serie V., 5 (1916): 487–506. **Anfossi.**

Saggio di catalogo delle isole minori italiane. By G. Anfossi. *Map.*

For each island the position, area, maximum and mean altitude is given, as well as a reference to the map on which the measurement has been made.

Italy—Meteorology. *B.R.S.G.* (*Rome*), Serie V., 5 (1916): 468–486. **Tascone.**

Riassunto delle osservazione meteorologiche eseguite all' Osservatorio Simbruino nel biennio 1914–1915 primo di sua fondazione. By D. Giacomo L. Tascone.

Italy—Piedmont—Lake Candia. **Accomazzo.**

B.R.S.G. (*Rome*), Ser. V., 5 (1916): 575–605.

Il lago di Candia nel Canavese. Osservazioni fisiche e batometriche. By Pericle Accomazzo. *Illustrations.*

Italy—Sicily—Etna. *G. Rev.* 1 (1916): 401–418. **Hyde.**

The volcanic history of Etna. By Walter Woodburn Hyde. *Illustrations.*

Mediterranean—Crete. *Blackwood's Mag.* 200 (1916): 70–78. **G. E. H.**

A Greek island. By G. E. H.

Poland. *B.R.S.G.* (*Rome*), Serie V., 5 (1916): 306–322, 385–402. **Ricchieri.**

Le basi geografiche della nazione polacca. By Giuseppe Ricchieri.

Russia—Sociology. **Hecker.**

Russian Sociology. A contribution to the history of sociological thought and theory. By Dr. Julius F. Hecker. (Vol. 67 of Studies in history, economics and public law, Columbia Univ.) New York: Columbia Univ. Press (London: P. S. King & Son), 1915. Size 10 × 6½, pp. 310. *Price* 10*s. Presented.*

United Kingdom—England—Tapestry-Maps.

Victoria and Albert Museum Portfolios. Tapestries. Part III. Tapestry Maps. English: 16th and 17th Cent. London, 1915. Size 15½ × 12. *Nine Plates. Presented.*

See note in vol. 45, p. 436. The plates give much-reduced facsimiles of the entire maps, with larger-scale copies of small areas. The text sketches the history of the maps, with short descriptions of each.

ASIA.

India—North-West. **Douie.**

The Panjab, North-West Frontier Province and Kashmir. By Sir James Douie. Cambridge: University Press, 1916. Size 8 × 5½, pp. xiv. and 374. *Maps and Illustrations. Price* 6*s. net. Presented.*

A volume of the Provincial Geographies of India, a series inaugurated by Thurston's 'Madras Presidency' (reviewed in *Journal*, vol. 43, p. 682).

Malay States—Kedah. **Robinson and Kloss.**

The natural history of Kedah Peak. By H. C. Robinson and C. Boden Kloss. (From *J. Federated Malay States*, vol. 6, Part 4, Feb. 1916.) Size 10 × 7, pp. 219–244.

Results of a recent exploration, the date of which is not mentioned.

Manchuria—Ethnology. **Torii.**
J. College Sc., Imp. Univ. Tokyo 36 (1915): Art. 8, pp. 80, pl. xxv.
Etudes archéologiques et ethnologiques. Populations préhistoriques de la Mandchourie méridionale. By R. Torii. *Map and Illustrations.*

Pamirs—Triangulation. *R. Engineers J.* 23 (1916): 241–250. **Burrard and others.**
The junction of the Indian and Russian triangulation work in the Pamirs. By Colonel Sir Sidney G. Burrard, Lieut.-Colonel G. P. Lenox-Conyngham, and Captain K. Mason.

Russia—Siberia—Economic. *Ann. G.* 25 (1916): 124–142. **Blanc.**
La colonisation et la mise en valeur de la Sibérie et de la Steppe asiatique. Par Edouard Blanc.

Russia—Siberia—Ethnology. *Museum J.* (*Philadelphia*) 7 (1916): 27–45. **Hall.**
The Siberian expedition. By H. U. Hall. *Illustrations.*
On the expedition organized by Miss Czaplicka, on which Mr. Hall represented the Pennsylvania University Museum.

Russia—Siberia—Taz. **Shukhoff.**
A general sketch of the basin of the River Taz in the Turukhansk district in North-West Siberia by I. Shukhoff. Achinsk, 1915. Size 8½ × 7, pp. 44. *Map and Illustrations. Presented.* [In Russian.]

Turkey—Geomorphology. *Z. Ges. E. Berlin* (1916): 248–251. **Frech.**
Der Aufbau der indoafrikanischen Wüstentafel auf türkischen Boden. By F. Frech.

AFRICA.

Italian Protectorates. *Esplorazione Com.* 31 (1916): 81–90; 126–135. **Nicola.**
L'Italia ed il futuro equilibrio Africano. By Angelo Nicola. *Maps.*

Italian Somaliland—Scientific Research. **Stefanini and Paoli.**
Missione Stefanini-Paoli. Ricerche idrogeologiche, botaniche, ed entomologiche fatte nella Somalia Italiana Meridionale (1913). By G. Stefanini and G. Paoli. (N. 7. Relazioni e Monografie Agrario-Coloniali.) Florence, 1916. Size 9½ × 6½, *Maps and Illustrations.*
Results of investigations in 1913 on the middle and lower Jub, and between that river and the Webi Shebeli. The various aspects of the country are illustrated by many excellent photographs.

Red Sea. *Petermanns M.* 62 (1916): 98–100. **Frobenius.**
Verlauf der vierten Reiseperiode der Deutschen Inner-Afrikanischen Forschungsexpedition. Von Leo Frobenius. III. Reisen am Roten Meer. *Sketch-map and Illustrations.*

South Africa—Geology. *South African J. Sc.* 12 (1916): 367–382. **Schwarz.**
The fault systems in the south of South Africa. By Ernest H. L. Schwarz.

South Africa—Historical. **Botha.**
Some early exploring expeditions and travels in South Africa. A lecture delivered . . . at the quarterly meeting of the Mountain Club. By C. Graham Botha. Cape Town, [N.D.] *Map.*

Tripoli. **Gwatkin-Williams.**
In the hands of the Senoussi. The story of the nineteen weeks spent as prisoners in the Lybian desert by the survivors of H.M.S. *Tara* and the horse transport *Moorina.* Compiled from the diary of Captain R. Gwatkin-Williams, R.N., by Mrs. Gwatkin-Williams. London: C. A. Pearson, 1916. Size 7½ × 5, pp. 112. *Sketch-map. Price* 1*s. net. Presented.*
Graphic narrative of captivity in the desert west of Egypt after the torpedoing of the patrol-boat *Tara* near the Gulf of Sollum, with attempted escape and ultimate rescue.

West Africa—Ivory Coast. *La G.* 31 (1916): pp. 1–30. **Renaud.**
Le port de la Côte d'Ivoire. By J. Renaud. *Illustrations.*

NORTH AMERICA.

Canada. **Hopkins.**
The Canadian Annual Review of Public Affairs. By J. Castell Hopkins, 1915. Fifteenth year of issue. Toronto: The Annual Review Publ. Comp., 1916. Size , × 6, pp. 880. *Illustrations. Presented.*

Canada—British Columbia. **Galloway.**

The call of the West. Letters from British Columbia. By Captain C. F. J. Galloway. London: T. Fisher Unwin, [1916]. Size 9 × 5½, pp. 328. *Map and Illustrations. Price* 12*s.* 6*d. net. Presented.*

Canada—Economic. **Adams.**

Commission of Conservation, Canada. The national domain in Canada, and its proper conservation. By Frank D. Adams. Ottawa, 1915. Size 9½ × 6½, pp. 48. *Maps and Illustrations.*

Canada—Forestry. **Leavitt.**

Commission of Conservation, Canada. Forest protection in Canada, 1913–1914. Compiled under the direction of Clyde Leavitt. Toronto, 1915. Size 10 × 6½, pp. xiv., 317. *Maps and Illustrations.*

Canada—Geodetic Survey. **Bigger.**

Department of the Interior. Report of the Chief Astronomer, 1908. Appendix No. 7. The Geodetic Survey. By C. A. Bigger. Ottawa, 1910. Size 10 × 6½, pp. 349–356. *Map and Illustrations.*

Describes the inception of the Survey in 1905 and subsequent operations.

United States—Boston. **Clapp.**

The Port of Boston. A study and a solution of the traffic and operating problems of Boston, and its place in the competition of the North Atlantic seaports. By Edwin J. Clapp. London: H. Milford, 1916. Size 9 × 6, pp. xii. and 402. *Plans. Price* 10*s.* 6*d. net. Presented.*

United States—Wisconsin. **Martin.**

Wisconsin Geol. and Nat. Hist. Surv., B. 36 (1916): pp. 549.

The physical geography of Wisconsin. By Lawrence Martin. *Maps and Illustrations.*

CENTRAL AND SOUTH AMERICA.

Brazil—Exploration. **Rondon.**

Commissão de Linhas Telegraphicas Estrategicas de Matto Grosso ao Amazonas. Conferencias realizadas nos dias 5, 7 e 9 de Outubro de 1915 pelo Sr. Coronel Candido Mariano da Silva Rondon no theatro Phenix do Rio de Janeiro sobre trabalhos da Expedição Roosevelt e da Commissão Telegraphica. Rio Janeiro, 1916. Size 9 × 6½, pp. xvi. and 266. *Maps and Illustrations. Presented.*

On the work of the Roosevelt-Rondon Expedition.

Brazil—Geology. *P. Amer. Philos. S.* 55 (1916): pp. 20. **Soper.**

The geology of Parahyba and Rio Grande do Norte, Brazil. By Ralph H. Soper. *Maps and Illustrations.*

Central America—Political. **Uribe.**

B. Minist. Relac. Exteriores (*Colombia*) 7 (1914): 283–289.

Nicaragua y las islas Mangles. Por Antonio José Uribe.

Maintains that certain rights of Costa Rica and Colombia (especially those of the latter to the Mangles Islands) are prejudiced by the treaty of 1913 between the United States and Nicaragua, the text of which is printed in Spanish.

AUSTRALASIA AND PACIFIC ISLANDS.

New Guinea—Dutch.

Reports on the collections made by the British Ornithologists' Union Expedition and the Wollaston Expedition in Dutch New Guinea, 1910–13. Two vols. London: Francis Edwards, 1916. Size 12½ × 10, pp. (vol. 1) vi. and [534]; (vol. 2) 674. *Maps and Illustrations. Presented.*

This finely got up work embodies reports by specialists on the various collections.

Pacific—Exploration. *P. Nat. A.Sc., U.S.A.* 2 (1916): 391–437. **Davis and others.**

Symposium on the exploration of the Pacific. [Articles by W. M. Davis and others.]

Inauguration of a movement for the continuous and systematic exploration of the Pacific from all points of view. Some of the articles record the results of recent research.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Compass. **Hall.**

Rev. William Hall's visible astronomical compass. (Zone 49° to 51° North Latitude, Mark I.) London: J. D. Potter, [1916]. Size 10½ × 8, pp. 2. *Diagram. Price* 1*s. net. Presented.*

Map-reading.

Map reading and panorama sketching. By an instructor. London: Sifton, Praed & Co., 1916. Size 7½ × 5½, pp. 62. *Maps, Plans, and Diagrams. Presented.*

A clear and concise exposition, likely to be of much use to military students.

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Geomorphology—Coral. *P. National A. Sc.* **2** (1916): 284–288. **Davis.**

Clift islands in the coral seas. By W. M. Davis. *Illustration.*

Will be noticed in the Monthly Record. "Clift" has no connection with "cleft," and would be written "cliffed" in this country.

Geomorphology—Coral. *Sc. Monthly* **2** (1916): 313–333, 479–501, 557–572. **Davis.**

Problems associated with the study of coral reefs. By W. M. Davis. *Illustrations.*

Geophysics. *Sc. Monthly* **2** (1916): 417–437, 536–556. **Chamberlin.**

The evolution of the Earth. By Thomas Chrowder Chamberlin. *Illustrations.*

Geophysics. **Hayford.**

The Earth from the geophysical standpoint. By John F. Hayford. [Repr. *P. Amer. Phil. S.*, vol. 54, No. 219, September, 1915.] Philadelphia, 1915. Size 9½ × 6½, pp. 11.

Glaciology. *Z. Gletscherkunde* **9** (1914): 66–71. **Werenskiold.**

Die Tiefe eines Gletschers. Von W. Werenskiold. *Illustrations.*

Mountains. **Dyke.**

The Mountain. Renewed studies in impressions and appearances. By John C. Van Dyke. London: T. Werner Laurie, [1916]. Size 7½ × 5, pp. xvi. and 234. *Illustration. Price* 6*s. net. Presented.*

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Archæology. **Perry and Smith.**

Mem. and P. Manchester Lit. and Phil. S. **60** (1916): Pt. i., pp. 36.

The relationship between the geographical distribution of megalithic monuments and ancient mines. By W. J. Perry. And remarks on Mr. W. J. Perry's communication by G. Elliot Smith. *Maps.*

Economic—Cattle supply. *Ann. G.* **25** (1916): 81–96. **Hitier.**

Les réserves de bétail dans le monde. Par Henri Hitier.

See note in the July number, p. 83.

Historical—Portuguese Cartography. **Vasconcellos.**

Sociedade de Geografia de Lisboa. Subsidios para a historia da cartografia Portugueza nos seculo XVI°, XVII°, XVIII°. (Separata do *Boletim* . . . mêses de Janeiro, Fevereiro, e Março.) Por Ernesto de Vasconcellos. Lisbon, 1916. Size 9½ × 6½, pp. 31.

A brief but useful account of early Portuguese cartographers and their work.

NEW MAPS AND PHOTOGRAPHS: ADDITIONS TO THE MAP ROOM. E. A. Reeves, Map Curator, R.G.S.

EUROPE.

Europe. **R.G.S. and G.S.G.S.**

The 1:1,000,000 (1 inch to 15·78 stat. miles) Map of Europe and the Near East. This map, which has been compiled at the Society under the direction of the Geographical Section, General Staff, is not sold by the Society, but may be obtained from the agents for the sale of G.S.G.S. maps. London: E. Stanford, Ltd., 12–14,

Long Acre, W.C.; Sifton, Praed & Co., 67, St. James's Street, S.W.; or T. Fisher Unwin, 1, Adelphi Terrace, W.C. *Price 1s. per sheet.* Printed in five colours. The sheets follow the arrangement of the Carte Internationale du Monde au Millionième, each covering 6° of longitude by 4° of latitude. For an account of the map see *Geographical Journal*, July 1915.

The following sheets are now published :—

North O. 34, Stockholm; O. 35, Riga.

N. 31, Amsterdam; N. 32, Hamburg; N. 33, Berlin; N. 34, Varshava; N. 35, Minsk.

M. 31, Paris; M. 32, Frankfurt; M. 33, Wien; M. 34, Krakau; M. 35, Jitomir.

L. 31, Lyon; L. 32, Milano; L. 33, Triest; L. 34, Buda Pest; L. 35, Bucuresti.

K. 34, Sofiya; K. 35, Istambul; K. 36, Sinob; K. 37, Batum.

J. 34, Athenai; J. 35, Izmir; J. 36, Konia; J. 37, Erzerum; J. 38, Tabriz.

I. 36, Beirut; I. 38, Baghdad.

Europe. **Bacon.**

Bacon's War Map of Europe embracing all the countries involved. Scale 1 : 4,000,000 or 1 inch to 63·1 stat. miles. Size 25 × 32½ inches. London : G. W. Bacon & Co., Ltd., 1916. *Price 6d. Presented by the Publishers.*

Europe. **Philip.**

Philips's Large-Scale Strategical War Map of Europe. Western Area. Scale 1 : 633,600 or 1 inch to 10 stat. miles. Size 36 by 46 inches. With complete index and enlarged plans of the chief fortified towns. Edited by George Philip, F.R.G.S., assisted by a Military Expert. London : George Philip & Son, Ltd., 1916. *Price 2s. 6d. net. Presented by the Publishers.*

A new edition of a map which was noticed in the *Geographical Journal* for January 1915. An inset of the British Battle Front on the scale of 1 inch to 5 miles has been added. By means of colours and symbols railways, roads, canals, fortresses and fortified places, airship depôts and other information of military importance is given. Woods are shown in green, and relief by hill shading in brown. There are altogether eight inset maps and plans, and the map is accompanied by an index to place-names as a separate pamphlet.

Europe. **Frigè.**

Dall' Adriatico al Mar Nero. D. Frigè, disegno e litog. Size 24 by 35 inches. Milan : Alfrieri & Lacroix, 1916.

An attempt at a panoramic bird's-eye view of the Balkan Peninsula, the Black Sea, and Western Asia Minor, showing also, on the northern horizon, Petrograd, Riga, and Berlin. The relief is of necessity greatly exaggerated, and it is rather difficult to understand what useful purpose can be served by a rough diagram of this kind.

France. **E. Stanford, Ltd.**

Stanford's Half-inch Map of the Battle Front east of Soissons. Stanford's War Maps No. 20. Scale 1 : 126,720 or 1 inch to 2 stat. miles. Size 19 by 28 inches. London : Edward Stanford, Ltd., 1916. *Price 3s. Presented by the Publishers.*

This map places Laon about 8 miles to the east of its western border, and extends about 40 miles to the east, and 20 miles to the north and south of that place. There is no hill shading, but relief is shown in tints of reddish-brown on the layer system, which change at the 125, 250, 500, and 1000 feet contours. Railways, roads, canals, woods, lakes, and marshes are shown. It is a good clear map for general reference.

Sweden. **Generalstabens Litografiska Anstalt, Stockholm.**

Kungl. Automobilklubbens Karta öfver Sverige. Utgifven af Generalstabens Litografiska Anstalt. Stockholm, 1915. *Presented by the Generalstabens Litografiska Anstalt, Stockholm.*

An official atlas containing eighteen maps specially prepared for the use of motorists. Roads, according to their various classes, railways, and canals are all clearly indicated, as well as other information likely to be of importance to travellers. In a work of this kind it is certainly advisable not to obscure the maps by hill-shading, but a few contour-lines or heights along the roads in figures might have been added with advantage. At the commencement is a well-arranged set of key maps, giving the outlines and numbers of the sheets in the atlas, and at the end an alphabetical index to place-names.

ASIA.

India. **Survey of India.**

Carte Internationale du Monde au 1,000,000° (1 inch to 15·78 stat. miles). Sheet: North F–42, Kāthiāwār. Compiled and engraved at the Survey of India Office, Calcutta, 1914. Published 1915. *Price* 1 *Rupee. Presented by the Surveyor-General of India.*

This is the second sheet of the Carte Internationale du Monde produced by the Survey of India. The first, the Bombay sheet, was published in 1914, and noticed in the *Geographical Journal* for October 1915. The limits of the present sheet extend from 20° to 24° N. lat. and 66° to 72° E. long., and thus the greater part of the Kāthiāwār peninsula and Cutch are included. It is a very creditable piece of work, and in style and method of production conforms as near as possible to the conditions laid down at the London and Paris Conferences. The contours drawn are every 100 metres up to 500, after which the 700 and 1000 metre lines are shown. The tints change at every contour. Most of the district is very lowlying, and there is only one spot, near Junagarh, where the altitude reaches 1000 metres. The sea-depths are shown by the 100, 200, 500, 1000, 2000, and 3000 metre contours, although the blue tints change only at 200, 500, 1000, and 3000 metres. Some of the smaller place-names are not so legible as they might be.

Java. **Bemmelen.**

Rainfall Atlas of Java and Madoera, containing seven maps giving the result of rainfall observations. By Dr. W. van Bemmelen. Published by order of the Government of Netherlands India. Batavia: Topografische Inrichtung, 1915. *Presented by the Government of Netherlands India.*

This atlas and the volume which it accompanies will be specially reviewed.

AFRICA.

Anglo-Egyptian Sudan. **Survey Dept., Khartoum.**

Africa. Scale 1:250,000 or 1 inch to 3·9 stat. miles. Anglo-Egyptian Sudan. Sheets: 55–H, Gedaref; 65–N, Raga; 77–G, Raffili; 77–K, Pembura. Size 18 by 26 inches. Compiled and zincographed at the Survey Office, Khartoum, 1916. *Price* 10 *P.T. each sheet. Presented by the Director of Surveys, Sudan Government, Khartoum.*

East and South Africa. **"South Africa."**

Conquered East Africa. Scale 1:2,534,400 or 1 inch to 40 stat. miles. Size 27 by 23 inches. Conquered South-West [Africa]. Scale 1:2,000,000 or 1 inch to 31·51 stat. miles. Size 27 by 23 inches. Supplement to *South Africa*, 30 September 1916. Published by authority at the offices of *South Africa*. London, 1916.

These belong to a series of maps, all of much the same character, appearing from time to time as supplements to the newspaper *South Africa*. Although somewhat roughly executed they contain useful and up-to-date information, specially with regard to railways and roads.

German East Africa. **Geographical Section, General Staff.**

Africa 1:1,000,000 (1 inch to 15·78 stat. miles). Sheet: South B–37, Dar es Salaam. Geographical Section, General Staff. No. 2465. Drawn and printed at the War Office, 1916. Size 18 by 27 inches. London Agents: E. Stanford, Ltd.; Sifton, Praed & Co.; T. Fisher Unwin. *Price* 2*s. net. Presented by the Director of Military Intelligence.*

AMERICA.

Canada. **Dept. of the Interior, Ottawa.**

Sectional Map of Canada. Scale 1:190,080 or 1 inch to 3 stat. miles. Sheet: 214. Rocky Mountain House, 8th edit., 1916. Ottawa: Department of the Interior, 1916. *Presented by the Department of the Interior, Ottawa.*

WORLD.

World. **Meyer.**

Meyers Physikalischer Handatlas. 51 Karten zur Ozeanographie, Morphologie, Geologie, Klimatologie, Pflanzen- und Tiergeographie und Völkerkunder. Leipzig and Vienna: Bibliographisches Institut, 1916.

Although small in size (measuring 9¾ by 6½ inches) this atlas contains a great deal of information, and will doubtless prove of considerable service. It comprises fifty-one carefully drawn coloured maps, based on the well-known Berghaus' Physikalischer Atlas and more recent authorities. The maps are arranged in eight sections, the first of

which deals with the Earth as a whole, and the second with the Sea, while the remaining six sections treat of the various physical phenomena of the continents and Oceania. Some of the maps are of special interest, and not usually met with in small atlases of this character.

PHOTOGRAPHS.

General.

Nine albums containing 630 photographs collected by the late Colonel Sir Charles M. Watson during his travels in various parts of the world. *Presented by Lady Watson.*

Sir Charles Watson, during his official duties and holiday vacations, travelled extensively, and during his many journeys brought together a most interesting collection of photographs, which through the kindness of Lady Watson has now been presented to this Society. These photographs are bound in nine albums, measuring about 15 × 11 inches, and, as will be seen from the list, form an important addition to the Society's collection. While many of the views taken in European countries and the near East are on the tracks of ordinary tourists or not far from them, others, such as those of Arabia and the Sudan, are of exceptional interest, especially as many of them represent scenes and events long since passed away. Some of the European views have a particular interest just now in connection with the war. The titles are as follows:—

Vol. 1.—Egypt—*Cairo:* (1) Sharia Bab el Hadid, Cairo; (2, 3) The Watson's home in Cairo; (4, 5) Shepheard's Hotel and the Royal Hotel, Cairo; (6, 7) The Citadel of Cairo, Bab el Azab and the procession of the Mahmal; (8, 9) Tomb of Sultan Kait Bey and old city gate, Bab el Nasr, Cairo; (10–12) The Abbasiyeh Road, lower gate of the citadel, tombs of the Memluks, Cairo; (13, 14) Hotel des Bains and view, Helouan, Cairo; (15, 16) Tomb of Mariette Pasha and Boulac Museum Garden, Cairo; (17) The Nile near Cairo; (18–21) Mosque of Sultan Hassan, and tomb of Sultan Barkuk, Cairo; (22–25) Tombs of the Mamluks, Date Harvest, the old canal, Cairo, and street of Tulun; (26–29) House St. Maurice, Cairo; (30) The Pyramids of Ghizeh; (31–35) The Sphinx and the Pyramids, and views on the Nile; (36) Road to the Pyramids at High Nile; (37, 38) Village of the Pyramid Bedouins, and tombs at the Pyramids; (39) Grove of date palms; (40, 41) High Nile and Egyptian Barracks, Abbasiyeh; (42, 43) Tomb of Sultan Barkuk and entrance to Serapeum, Sakkarah; (44, 45) Sheep and Shepherds; and Sebil, Sharia Bab el Hadid; (46) Tomb of Tih, Sakkarah. *Tour on the Nile* 1885*:* (47) The S.S. *Nasretiyeh*; (48) Rock-cut tombs at Beni Hassan; (49, 50) Temple of Denderah; (51) Village of Luxor; (52) Sheikh Minshetta of the Ababdeh; (53–55) Temple of Luxor; (56–61) Temple of Karnac; (62) Temple of Esneh; (63) Temple of Edfou; (64) Gebel Silsileh, rock-cut tablets; (65) Komombos; (66, 67) Temple of Philæ. *Mecca and Medina:* (68) Gate of Safa at Mecca; (69, 70) Pilgrims walking round the Kaaba, and at prayer; (71) The great mosque at Mecca; (72) Moala—Burial-place of the family of Mohamed; (73) Camp of the Pilgrims at Monah; (74) Mount Arafat; (75, 76) City of Medina; (77, 78) Tomb of Mohamed at Medina, and Sheikh of the Mosque.

Vol. 2.—Egypt: (1–8) The Mosque of Sultan Nasir ebn Kalaoun, Cairo.

Vol. 3.—Egyptian Sudan—*Suakin:* (1, 2) Suakin—general view of the island and town and harbour; (3) Suakin—Shenawi Bey's house, Government and Customs House; (4) Indian lines, looking towards Suakin; (5, 6) Osman Digna's house and the house of Shamsi the merchant, Suakin; (7, 8) Shenawi Bey's house and a shop in Suakin; (9, 10) House of Sadik Bey and a street in Suakin; (11, 12) Suakin Harbour, looking seaward; and Suakin causeway leading to El Kaff; (13) Grave of Lieut. Askwith, R.E.; (14) Condensers at Suakin; (15, 16) Huts of the Suakin natives and warriors of Suakin; (17, 19) Amarars; (18) Es Sayid Mohamed el Morghani and followers; (20) Sir C. Warren and his staff; (21, 22) The Black Battalion and the 1st Egyptian Battalion; (23) Forts Carysfort and Euryalus; (24) The lines of Suakin, Westaniah Bastion; (25, 26) The South and North Water fort; (27, 28) The Quarry fort and south lines; (29) Fort Hudson; (30) Fort Greaves; (31) The west Redoubt; (32) The causeway and caravanserai; (33) Group of officials with Sir C. Warren; (34) A street in Jeddah. **Turkey:** (35) The Bosphorus from the Castle of Rumili-Hissar; (36) The bridge over the Golden Horn, Constantinople; (37, 38) The Tower of Galata and Seven Towers, Constantinople; (39) The gate of the old Seraglio, Constantinople; (40) Interior of Santa Sophia, Constantinople; (41) The Obelisk of Thothmes III., Constantinople; (42, 43) The Museum of Antiquities and a street in Stambul; (44, 45) The Aqueduct of Valens, and a Turkish cemetery, Constantinople; (46, 47) The tombs of the Sultans and the tomb of Sultan Murad, Brusa; (48, 49) The tomb of Sultan Orchan, and the Gate of Hissarlik, Brusa. **Greece:** (50, 51) The Gate of Hadrian and the Acropolis, Athens.

Vol. 4.—Norway: (1, 2) Christiania—Carl Johan's Gade and the Viking ship; (3, 4) Frognersæter; (5) Asker in winter time; (6) Holmenkollen—the lake; (7) Bygdo

—the old wooden church ; (8) The Valkeyrie, by P. N. Arbo ; (9) Cutting out ice for export ; (10) Notodden—the Tinfoss ; (11) The Skirende, 18 February 1895 ; (12) Steamer arriving at Christiania after a snowstorm ; (13–15) Trondhjem—the Cathedral ; and the Lerfoss ; (37) Bergen ; (38) Sognefjord—the Nerofjord ; (39) The Hardanger Fjord ; (40) The Laatefoss near Odde ; (41) Dalen ; (42) The canal locks at Loveid, near Skien ; (43) The Bandak Canal, Tellemarken ; (44) Holden House near Ulefoss, residence of the Cappelns ; (45) Ringerike, Hofsfos ; (46) Sognefjord near Gudvangen, 1897 ; (47) Ringerike—road to Kroklevin, 1892 ; (95) The Fjord, Arendal ; (96, 97) Larvik—view of the port and the beechwoods ; (98–100) Sandefjord ; (101–104) Drobak—View from Ellingstad, view looking towards Oscarberg, view of Haaöen and Oscarsberg and view from above Husvik. **Sweden :** (16, 17) Stockholm—the Riddarholm and church in Riddarholm ; (18–20) Upsala—the Cathedral ; (21–24) Lund—the Cathedral ; (48, 49) Gotland—Wisby : view of the town walls and Church of St. Nicholas ; (50–54) Gotland—Wisby : the Cathedral of St. Mary, Church of St. Catherine, Church of the Holy Ghost, and Church of St. Göran. **Denmark :** (25) Copenhagen—the fish market ; (26) Copenhagen—Rosenberg Palace ; (105, 106) Aalborg—Osteraagade and the house of Jens Bang ; (107) Esbjerg—the Port. **Germany :** (27, 28) Lübeck—general view of the town and entrance to town from the railway station ; (29, 30) Lübeck—the Holstein Gate and the Cathedral ; (31, 32) Lübeck—front of old house and Town Hall ; (33, 34) Lübeck—the Schiffergesellschaft, interior and exterior ; (33, 36) Bremen—the market-place and Town Hall. **Bermuda :** (55, 56) Clifton—the C.R.E.'s quarter and view from Clifton House looking over Hamilton Harbour. **Canada :** (57, 58) Quebec—view from Port Lewis and view looking towards the Citadel ; (59–61) Montreal—Dominion Square, and view from Mount Royal and the railway up Mount Royal ; (62) Hamilton—view from the mountains : (63) Toronto—view from the Park ; (64) Montreal—the Chateau de Ramezay—the old residence of the Governors ; (65–67) Niagara Falls—view from suspension bridge, and the Horseshoe Falls and the Whirlpool Rapids ; (68) River St. Lawrence—the Thousand Islands ; (69) River St. Lawrence—the Long Sault Rapids. **Madeira :** (70–72) A street in Funchal, and the Castle at Funchal. **Cape of Good Hope :** (73) Table Bay, Cape Town, Table Mountain behind ; (74–76) The Castle, Cape Town ; (77) Main Barracks, Cape Town, the Officers'-Mess block ; (78) Charlie's Hope, near Rondebosch ; (79) The Observatory, the Devil's Peak in the distance ; (80) Simon's Town ; (81) Erinville, Table Mountain and Devil's Peak in the distance ; (82, 83) South African weeds—Mowbray, a field of white lilies ; (84) Wynberg. **St. Helena :** (85, 86) James Town from the anchorage, and James Town looking seaward ; (87) A view in the mountains ; (88) James Town—the ladder leading up to Ladder Hill Barracks ; (89, 90) Napoleon's grave and Longwood House. **Ascension :** (91, 92) The Rollers and George Town ; (93, 94) Naval Office and Stores and the Barracks.

Vol. 5—Minorca : (1–3) Port Mahon ; (4) Ruins of Fort St. Phillip ; (5–7) Talayot of Torello and Talayot of Talati di Dalt, and Talayot of Trepuco. **Majorca :** (8–13) Buildings in Palma ; (14) Alcudia—the gate of the town. **Spain :** (15) Barcelona—Interior of the Cathedral. **Algeria :** (16, 17) Tclemcen—two views ; (18, 19) Tclemcen—the Mosque of Abu el Kassem ; (20, 21) Tclemcen—the Great Mosque and gate of the Mosque of Sidi Haloui ; (22–30) Tclemcen—the Mosque of Sidi Bou Medina ; (31–33) Tclemcen—the walls and tower of Mansourah ; (34, 35) Constantine—cascade and ravine of the Roummel ; (36, 37) Biskra. **Tunisia :** (38–40) Tunis—the street of Ben Ziad and view in the Bazaar, and market-place of Bab Soulka ; (41) Susa—view from the landing-place ; (42) Kairuan—view of the town ; (43–46) Kairuan—the great Mosque ; (47–49) Kairuan—the mosque of El Sahiby. **Malta :** (50, 51) Gozo—The Giant's Tower and the city of Rabato. **France :** (52) View of old Carcassonne ; (53, 54) Carcassonne—the walls and the Narbonne gate ; (55) Lyons ; (56–58) Orange—the Roman Triumphal Arch and the Roman Theatre ; (59) Avignon—the old bridge over the Rhone ; (60) Avignon—exterior view of the town walls ; (61–64) Avignon—the Palace of the Popes, the tower of Villeneuve, and gate of the Castle of St. André ; (65–67) Arles—the Roman Theatre ; (68–70) Arles—St. Trophisme ; (71, 72) Nimes—The amphitheatre ; (73, 74) Nimes—Temple of Diana, and house ; (75, 76) Nimes—Le Tour Magne and Pont du Gard ; (77–79) Aigues Mortes—the walls and principal gate of the town ; (80) Aigues Mortes—the Tower of Constance. **West Indies :** (81, 82) Government House, Barbados, and a native street in Bridge Town ; (83, 84) Up Park Camp and St. Andrew's Church, Jamaica ; (85) The harbour of St. Lucia ; (86) Looking towards Castries from the Vigie, Piton Flor Mountain in distance, St. Lucia ; (87, 88) The landing-place at Castries and parade of West Indian troops, St. Lucia ; (89, 95) Blue Basin Waterfall, Trinidad, and Government House ; (90, 94) Scene in St. Lucia—and Castries ; (91) Scene in Barbados ; (92) Scene in Trinidad ; (93) Scene in Jamaica.

Vol. 6.—(1–4) Gibraltar. **France :** (5, 6) Marseilles—the old port and Church of St. Victor ; (25, 26) Reims—the Cathedral ; (27–29) Reims—Church of St.

Remy, and the Roman arch; (30) Laon—the Cathedral; (31, 32) Laon—the Soissons and Ardon gates; (33, 34) Laon—the Church of the Knights Templar and the Leaning Tower; (35) St. Malo—the High Street; (36–38) Mont St. Michel; the hall of the knights and the cloisters of the church; (39–41) Vitré—general view, the Castle, and Rue de la Poterie; (42, 43) Vitré—Rue de Paris and Château des Rochers; (44–47) Paris—the Exhibition of 1900. **Tunisia**: (7) Biserta—entrance to the harbour; (8) General view of native town of Tunis. **Malta**: (9, 10) Valetta—Strada Reale and the Upper Barracca; (11, 12) Streets in Valetta; (13) Valetta—the Marsamuscetto landing-place; (14–16) The Council Chamber in the Governor's Palace, Valetta, and other rooms in the palace. **Sicily**: (17–20) Catania—the Cathedral, Harbour, Inner Port, Cathedral Square, and Piazza St. Phillipe; (21) Catania—a country cart; (22) Palermo —gate of the Cathedral. **Italy**: (23, 24) Milan—the Cathedral. **Switzerland**: (48) Geneva—the port; (86) Lake of Geneva—Mont Blanc from Pregny. **Holland**: (49) The Market-place, Arnhem; (50–52) Nymegen—view from Lent, ruins of Carlovingian palace and the Town Hall; (53, 54) Leeuwarden—the Oldehove Tower, and the Market-place; (55–57) Groningen—Market-place, Collecte House, and Tower of St. Martin; (58, 59) Hoorn—the Harbour Tower and the Weigh House; (60) Alkmaar —the Weigh House; (61–63) Haarlem—the Church of St. Bavo and Town Hall; (64) The Island of Marken; (65) Monikendam in the Waterland; (66) Utrecht; (67, 68) Utrecht—the Cathedral; (69) View near Zaandam; (70–72) Leyden—The Weigh House and the Cloth Hall; (73) The Hague—a view in the Bosch; (74, 75) Delft—Gemeinlandshus and tomb of William the Silent in the old church; (76, 77) Dordrecht —the Groothoofd Gate; (78) Rotterdam; (79) Middleburgh—the Town Hall. **England**: (80, 88) Bridgnorth—Town Hall and North Gate; (82, 83) Bridgnorth—the old Castle and the North Foundry; (84, 85) Winchester Cathedral.

Vol. 7.—France: (1) Rouen—general view of the town; (2, 3) Rouen—the Cathedral; (4, 5) Rouen—St. Ouen and St. Maclou; (6, 7) Rouen—the Clock Tower and Palais de Justice; (8, 9) Chartres—the Cathedral; (10–12) Chartres—St. Pierre, the Eastern Gate and the house of Queen Bertha; (13–15) Orleans—the Museum and the Cathedral; (16, 17) Blois—the Château, Palace of Francis I.; (18) Blois, St. Nicholas; (19) Chambord—the Château; (20) Amboise—the Château; (21, 22) Tours—the Cathedral; (23) La Châtre—old houses on the Indre; (24–26) Bourges—the Cathedral; (27, 28) Bourges—the house of Jacques Cœur; (29, 30) Bourges—the old Hotel de Ville and Hotel Lallemand; (31, 32) Paris—Nôtre Dame and the Sainte Chapelle. **Germany**: (33) Lübeck—The Burg Thor; (34, 35) Lübeck—on the Untere Trave and the Market-place, looking towards the Rathhaus; (69, 70) Danzig—view on the River Mottlau and the Fish Market; (71, 72) Danzig—the Langemarkt and entrance to the Rathhaus; (73, 74) Danzig—the Stock Thurm; (75, 76) Danzig—the Zeughaus and English clothmakers' hall; (77, 78) Danzig—the Frauengasse and St. Mary's; (79) Danzig—hall in the Artus house; (80) Stettin—view on the Oder; (81, 82) Stralsund—view from the Frankenteich and Church of St. Mary; (83–85) Stralsund—the Church of St. Nicholas; (86, 87) Stralsund—the Kuter Thor and the Rathhaus; (88) Hamburg—in the old town; (89) Kiel; (90) Marienberg—the Castle of the Knights of the Teutonic Order; (91, 92) Düsseldorf—the Hofgarten and Market-place; (93) Brunswick—north aisle of the Cathedral. **Sweden**: (36, 37) The Stockholm Fjord; (38) Mariehamn, Aland Islands. **Finland**: (39) Åbo—view on the Aura River; (40) Åbo—the Castle; (41, 42) Åbo, the Cathedral; (43) Tammerfoss—the Tampereen Rapids; (44, 45) Helsingfors from the north and view of harbour from Blekholmen; (46, 47) Helsingfors —the Salutorget, and Rapellet Restaurant on the Esplanade; (48) View on one of the fjords; (49) Lovisa—view near the landing-place; (50) Kotka—the Belvedere; (51, 52) Viborg; (53) The Saima Canal near Justila; (54) The Imatra Rapids. **Russia**: (55) Petrograd—the statue of Peter the Great; (56) Petrograd—the Nevski Prospect; (57, 58) Petrograd—St. Isaac's and the Senate, and the Winter Palace; (59, 60) Petrograd —the Cathedral of St. Isaac and the Cathedral of Kasan; (61) Petrograd—the Arch of Narva; (62–64) Moscow—The Kremlin; (65, 66) Moscow—the Romanoff house in the Varvarskaia. **Poland**: (67, 68) Warsaw.

Vol. 8.—Spain: (1) Members of the Mounted and Dismounted Corps, Spanish gendarmerie; (2, 3) Burgos—the Cathedral; (4, 5) Avila—the walls and the fortified apse of the Cathedral; (6) The Escorial; (7) Madrid—the Royal Palace; (8) Toledo—entrance to the town and bridge over the Tagus; (9) A street in Toledo; (10, 11) Toledo—Santa Cruz; (12, 13) Toledo—the Synagogue del Transito and the cloisters of San Juan de los Reyes; (14) Toledo—view from the bridge; (23–26) Cordova—the Mosque; (27–33) Granada—the Alhambra; (33, 34) Granada—the Cathedral, and the tomb of Ferdinand and Isabella; (35) Seville—the hotel of Madrid; (36, 37) Seville—a street on market day and the Giralda Tower; (38, 39) Seville—Cathedral and the old walls; (40, 41) Seville—the house of Pilate and the Alcazar; (42) Cadiz—general view from the tower of Vigia Tavira; (44, 45) Gibraltar; (46) The shooting of General Torrijos

and his companions in 1831; (47) Malaga—general view from harbour; (48) Elche; (49) Alicante; (50, 51) Valencia—the gate of Serranos and the cathedral; (52, 53) Tarragona—the old walls and the gate of St. Antonio; (54, 55) Tarragona—the Cathedral cloisters; (56, 57) Barcelona—Paseo de Colon and the Rambla; (58, 59) Barcelona—the north door of Cathedral and the Church of Santa Maria del Mar; (60, 61) Gerona—ruins of the Gironella Tower and the Collegiate church of St. Felix; (62, 63) Monserrat—the Convent; (64, 65) Zaragoza—the Cathedral of El Pilar and the Carmen gate; (66, 67) Zaragoza—the leaning tower in Plaza St. Felipe and the cathedral of El Seo; (68–70) Pamplona—the Cathedral; (71) Pamplona; (72) San Sebastian. **Portugal**: (15) Lisbon—the great aqueduct; (16, 17) The Convent of Belem, Lisbon; (18) Cintra—Castle da Penha; (19) Alcobaça—the Cloisters; (20–22) The Batalha, Lisbon. **Morocco**: (43) Tangier—the wall and gateway.

Vol. 9.—**France**: (1) Lisieux—the Church of St. James; (2) Lisieux—the Cathedral looking east; (3–6) Caen—the churches of St. Stephen, St. Peter (east end), St. Saviour, Holy Trinity; (7, 8) Le Mans, the Cathedral, eastern apse and nave; (9) Angers—the Cathedral of St. Maurice; (10) Angers—the Prefecture, Roman arches discovered in 1836; (11) Angers—north side of the Château; (12) The house of Louis Adam, Angers; (13, 14) Nantes—west façade and west front of the Cathedral; (15) Nantes—view of the Castle from the court; (16, 17) Poitiers—west front of the Cathedral and Church of Ste Radigonde; (18) Poitiers—the Château Maubergeon and west end of the guard chamber; (19) Poitiers—the Church of St. Porchaire; (20, 21) Poitiers—the Baptistery of St. John; (22) Poitiers—the Church of Notre Dame. **Norway**: (23, 24) Sœtersdal—the Reiar Foss at Ose and a Stabur at Ose; (25–26) The Cathedral and view from Bjergsted, Stavanger; (27) Odde on the Hardanger Fjord; (28) The stream at Ullenswang; (29) Suledal's Porten; (30) Skjervefossen; (31) Bratland's Elo; (32, 33) Bratlandsdal; (34, 35) Loftus and Hardanger Fjord; (36, 37) Ullensvang, Hardanger Fjord; (38) Christiansand.

Canada and Alaska. **Chapman.**

Sixty-five photographs, including eight enlargements and five panoramas, and an album containing 560 picture postcards of Alaska, British Columbia, Alberta, and Ontario, taken by J. Howard Chapman, 1915. *Presented by Mr. J. Howard Chapman*, 1916.

Many of these photographs are especially good. The panoramas and enlargements represent some of the finest mountain, lake, and forest scenery of the Rocky Mountain region. The enlargements are of various sizes, but the largest measure 15 by 23½ inches. The picture postcards are also interesting, and if the views they represent are not all of particular geographical importance, they will doubtless be of interest to those who have visited this region. Amongst them are photographs of fine mountain scenery, public buildings, and places of importance in Calgary, Edmonton, Vancouver, Banff, Laggan, and other places more or less familiar to travellers.

Alaska: (1) Totem pole at Wrangle, Alaska. **British Columbia**: (2, 3) Indian totem poles, Alert Bay, North-East Vancouver; (4) Boundary post on British Columbia-Alaska boundary at Stewart, head of Portland Canal; (5) *Princess Victoria* entering harbour, Victoria, B.C.; (6) Parliament Buildings, Victoria; (7) Entrance to Stanley Park, Vancouver; (8, 9) Big trees, Stanley Park, Vancouver; (10) Second beach, Stanley Park, Vancouver; (11) Cross roads, Stanley Park, Vancouver; (12) Siwash Rock, Stanley Park, Vancouver; (13) Suspension bridge, Capilano Cañon, North Vancouver; (14) After the night watch, Steveston; (15) The salmon harvest—inside of a Fraser River cannery, preparing the fish for canning; (16) Columbia River, Castlegar, where Kootenay River runs in; (17) The Kootenay River, near Nelson; (18) Twin Falls, Kootenay Lake; (19) Glacier House, Glacier; (20) From the Asulkan Valley Trail, Glacier; (21) Panorama view from Mount Abbot; (22) The C.P. Railway climbing Rogers Pass, showing snowsheds, the Hermit Range, and a glimpse of Marion Lake from Mount Abbot, Glacier; (23) Panorama of the Illecillewaet Valley, Glacier; (24) The Illecillewaet Glacier; (25) Swiss guide upon Illecillewaet Glacier; (26, 27) Mount Sir Donald Glacier; (28) Stony Creek bridge on the C.P.R., 296 feet high; (29) Mount Burgess, near Field; (30) Emerald Mountain, near Field; (31) Emerald Lake, Field; (32) Camp McNeille, Summit Lake, Yoho Valley, Field; (33) Twin Falls, Yoho Valley, Field; (34) Mount Stephen, near Field; (35) Through the shoulder of Mount Stephen; (36) Cathedral Mountain, near Field; (37) Springer Creek Falls; (38) On the shore of Vaseux Lake; (39) Climbing the Rockies; (40) Summit of the Rockies; (41) The Great Divide (stream on left flows into Atlantic, while that to the right into Pacific); (62) Hunting in Northern British Columbia, Caribou bull and Indian guide; (64, 65) The Arctic exploring ship *Karluk*, Esquimalt Harbour. **Alberta**: (42) First crossing of the Kicking Horse; (43) In the Kicking Horse Cañon; (44) The Crow's Nest Mountain, Crow's Nest Pass Railway; (45) Mount Aberdeen; (46, 47) Lake

Louise, Laggan; (48) Bridal Falls, Laggan; (49) The Chalet, Lake Louise, Laggan; (50) Panorama from the Saddleback, Laggan; (51) Panorama of the Bow Valley, Banff; (52) Panorama of the Bow River Falls and Tunnel Mount, Banff; (53) Bow River from the summit of Tunnel Mount, Banff; (54) The Valley of the Bow; (55) Bow River, Banff; (56) Bow River Falls; (57) Cascade Mountain, Banff; (58, 59) The Three Sisters, Canmore; (60) Gathering firewood in the Far North; (61) Bison "memories only" of the Kingdom of the Plains. **Ontario:** (63) Making Port, Fort William.

Panama. **Porras.**

Album containing one hundred photographs taken on an expedition to the Gulf of San Blas, north coast of Panama, by Dr. Belisario Porras, President of the Republic of Panama, 1915. *Presented by Dr. Belisario Porras.*

These photographs were taken during the Panama Government excursion to the numerous little-visited islands and the bay of San Blas in the neighbourhood of Colon, concerning which a note appeared in the *Geographical Journal* for last month. They are characteristic of the scenery and people, and form a welcome addition to the Society's collection. They measure 6½ by 9½ inches.

(1–5) Buildings in Portobelo; (6) Point Draque in Portobelo; (8) Guaira; (9) Isle of the Padre; (10) Promontory of Portobelo; (11) Sailing along the coast; (12) Creek of Calidonia; (13) Sailing in the gulf; (14) Creek of Isla Grande; (15, 16) Isla Grande; (17) Isle of Naluneca: (18) Mouth of the Mandinga River; (19) River Mandinga; (20, 21) Ascending River Mandinga; (22) Front of the delta of River Mandinga; (23) Leaving the Mandinga River; (24) Isle of Arretupo; (25) Isle of Ubigantipo; (26) Island of Little Narrasgantupo; (27) Isle of Nusatupo; (29) Isle of Guarsatupo; (30, 31) Narrasgantupo; (32) Boys of Chugatupo (Carli); (33) Nergala beach; (34) Landing at the beach of Nergala; (35) Mouth of the Rio Nergala; (36) Isle of Subutupo; (37) Yantupo; (39–41) In Chugatupo; (42) Mandinga Isles; (43) Huerhuertupo; (44–47) Nargana Yantupo; (45) San José de Nargana; (46, 51–61) Nusatupo; (48, 62, 63) In Nargana; (49) School in Nargana; (50) The mistress and pupils in Nargana; (68) Yalatuma; (69, 73) Tupile, Rio Diablo; (75) Chico beach; (76) Ucuseni; (77) Olobanique with aldermen and policemen and the interpreter Benito; (78) Aligandi—Headman Colman; (79) Portogandi; (80) In Aligandi; (81) Portogandi—the Assembly; (83) Isle of Pinos; (84) Port Obaldia; (85) Towing the boat into harbour, Sarpingana; (86) Saguila Urtomate at his arrival at the steamer, Carti; (87) Saguila Urtomate and his secretary in Carti; (88) Porvenir, Caiguirgortupo; (89) Hoisting the flag in the Island of Porvenir; (90) Receiving the flag in the Island of Porvenir; (91) Taking possession of the Island of Porvenir; (92) On the Point, Island of Porvenir; (93) Among the palms in the Island of Porvenir; (94) Disembarking timber in the Island of Porvenir; (95) Laying the foundation stone of the house of Administration, Porvenir Isle; (96) Installation of carpentry in the Isle of Porvenir; (97) The tent of the engineer in Porvenir; (98) Commissariat tent of the expedition; (100) General view of the camp in the Island of Porvenir.

Salvador. **Wacher.**

Ten photographs of the Hacienda Chilata, Balsam Coast, Salvador, Central America. *Presented by C. J. Wacher.* 1916.

The Hacienda Chilata is the property of Sr. Don Salvador Sol M., situated in the district that supplies the so-called Balsam of Peru. Mr. Wacher states in a letter that the photographs were given to him by Sr. Don José Antonio Aguilar. They measure 6½ by 4½ inches.

(1) Buildings, Hacienda Chilata, Balsam coast; (2) Natives extracting balsam, showing great size to which the trees grow; (3) Coffee in blossom on the hacienda; (4) Bridge over arroyo (stream) leading to hacienda buildings; (5) Coffee plantation on the hacienda; (6) The Montaña or forest; (7) Road through the forest; (8) A parasitic fig, known as "matapolo"; (9) A balsam collector's hut in the forest; (10) A forest stream.

Switzerland.

Panorama of Linththal, Braunwald. *Presented by Mr. J. Howard Chapman.*

N.B.—It would greatly add to the value of the collection of Photographs which have been established in the Map Room if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

Sketch Ma

GOLD C

to illustrate th

A. E. KI

Published by the Royal Ge

ch Map of the

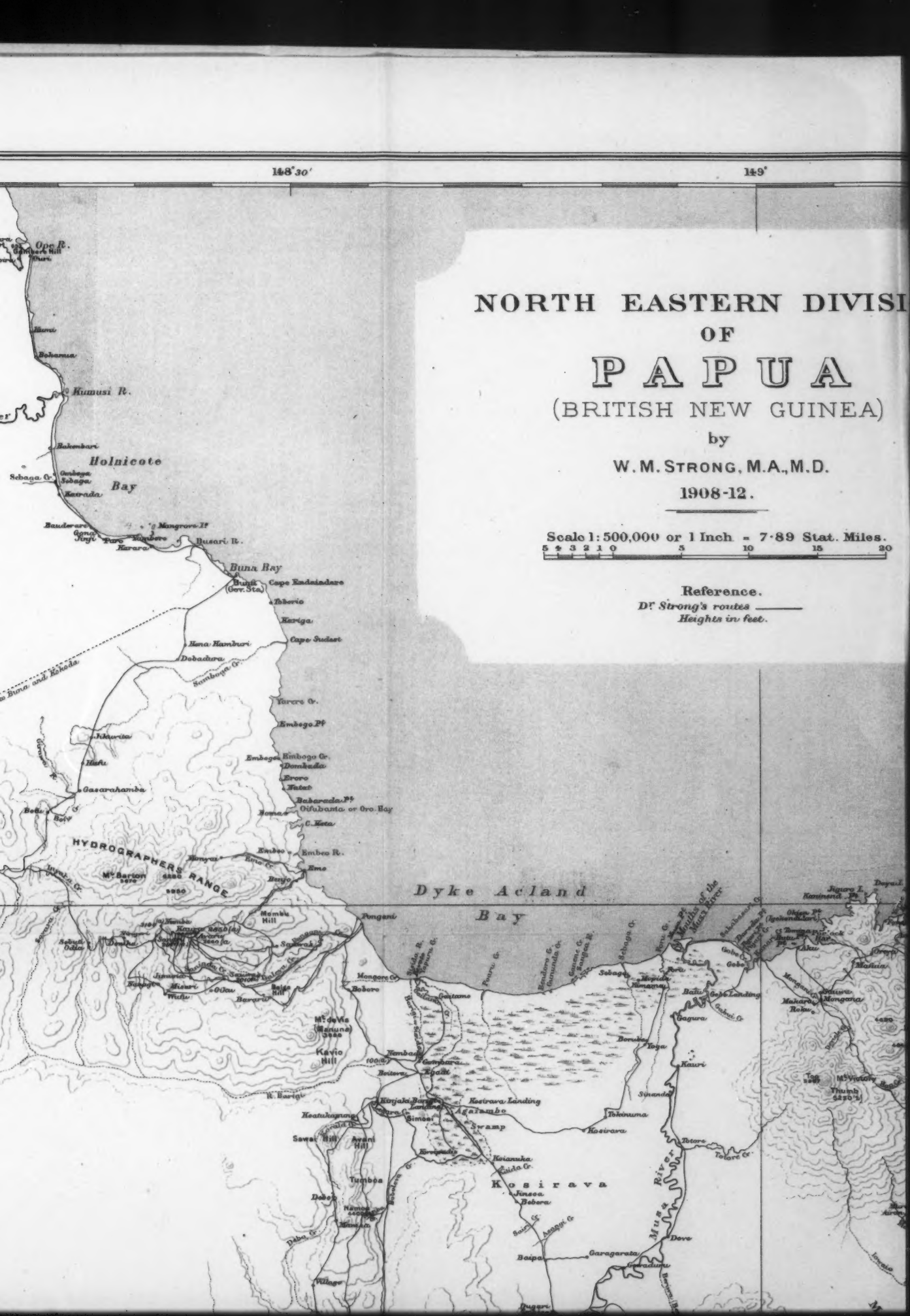
D COAST

trate the paper by

E. KITSON

GOLD COAST
Kitson

148°
8° 30'
9°
Paholo L.
Koiena L.
Kapuna
Kaporo
Kevre
Opi
Ghimori
Muri
Opi River
Karigi
Biaga R.
Biaga
Apochi
Urusatutu
Uma
Mambar
Ceva
Pirabuta
Tomata Ch.
Kerina 285 ft.
Lat. 8° 22' 12" (Gov. Sta.)
Tomata Store
Bateri
Korereda
Siviata gardens
Two houses
Lat. 8° 24' 48"
Houses belonging to Siviata village
Kumusi River
Ahomu
Lat. 8° 29' 48"
Kasare
Barina
Sebaga
Purigata
Lat. 8° 33' 12"
Sausata
Lat. 8° 34' 42"
Baberada
Aserusu
Mambare River
Kekiai
Morgu
Maimbatutu
Bomombokulu
Loiba
Dahuara
Lat. 8° 46' 6"
Daritavari
Samalavari
Ambari
Road to Buna and
Korobambira
Kausi
Lat. 8° 50' 36"
Mambare R.
Kumusi R.
Kokoda
1810 ft.
Lat. 8° 53' 12"
Kokoda C.
Mt. Victoria
8120
S.E. Peak
Huxley Pk.
10450 (?)
Mt. Service
11500 ?
Lat. 8° 54' 12"
Mt. Lamington
9234
Boku
Little Kumusi R.
Gaumi
Mt. Baru Baru
Mt. Uruba
9030 (?)
Mt. Bellamy
Mt. Monckton
9000 ?
Mt. Kaneva
9000
Mt. Nisbet
OWEN STANLEY RANGE


148°30'
149°
NORTH EASTERN DIVISI
OF
PAPUA
(BRITISH NEW GUINEA)
by
W. M. STRONG, M.A., M.D.
1908-12.
Scale 1: 500,000 or 1 Inch = 7·89 Stat. Miles.
5 4 3 2 1 0 5 10 15 20
Reference.
Dr Strong's routes
Heights in feet.
Holnicote Bay
Buna Bay
Dyke Acland Bay
HYDROGRAPHERS RANGE
Kumusi R.
Musa River
Kosirava
Agalambo
Swamp
Kavio Hill
Mt Davis (Manuna) 3880
Mt Victory 4250
Mt Barton 8960
Gasarahamba
Oifubanta or Oro Bay
Cape Endeiadare
Cape Sudest
Dobadura
Embogo Pt
Embogo R.
Pongani
Mambu Hill
Bebore
Beiaro Hill
Sawai Hill
Avani Hill
Tumbaa
Debo
Navio
Mumuah
Village
Bebera
Garagarata
Gwaradumu
Dogari
Dove
Tolore
Kosirara Landing
Kwarara
Thinuma
Kauri
Gagura
Yega
Batu
Gobe
Gobe Landing
Sebaga
Mangara
Makaro
Rakau
Mafuia
Akau
Jinsoa
Kwarara
Kwaruka
Kwaiauka
Kwaiauka Landing
Kwaiauka Gr.
Simoni
Kwarara Landing
Kwarara Gr.
Kwarara R.
Kwarara Village
Kwarara Mission
Kwarara Station
Kwarara Hill
Kwarara Swamp
Kwarara Creek
Kwarara Bridge
Kwarara Road
Kwarara Track
Kwarara Path
Kwarara Ford
Kwarara Ferry
Kwarara Boat
Kwarara Canoe
Kwarara Paddle
Kwarara Oar
Kwarara Rudder
Kwarara Sail
Kwarara Mast
Kwarara Yard
Kwarara Boom
Kwarara Gaff
Kwarara Peak
Kwarara Ridge
Kwarara Valley
Kwarara Plain
Kwarara Plateau
Kwarara Mountain
Kwarara Hill
Kwarara Range
Kwarara Spur
Kwarara Gully
Kwarara Creek
Kwarara River
Kwarara Lake
Kwarara Swamp
Kwarara Marsh
Kwarara Bog
Kwarara Fen
Kwarara Moor
Kwarara Heath
Kwarara Grass
Kwarara Reed
Kwarara Sedge
Kwarara Rush
Kwarara Flag
Kwarara Iris
Kwarara Lily
Kwarara Water
Kwarara Weed
Kwarara Algae
Kwarara Moss
Kwarara Lichen
Kwarara Fungus
Kwarara Mushroom
Kwarara Toadstool
Kwarara Puffball
Kwarara Bracket
Kwarara Agaric
Kwarara Boletus
Kwarara Russula
Kwarara Lactarius
Kwarara Cortinarius
Kwarara Amanita
Kwarara Death Cap
Kwarara Destroying Angel
Kwarara Fly Agaric
Kwarara Panther Cap
Kwarara Blusher
Kwarara Parasol
Kwarara Shaggy Mane
Kwarara Inky Cap
Kwarara Coprinus
Kwarara Psathyrella
Kwarara Pholiota
Kwarara Hypholoma
Kwarara Stropharia
Kwarara Naematoloma
Kwarara Galerina
Kwarara Conocybe
Kwarara Bolbitius
Kwarara Agrocybe
Kwarara Pholiotina
Kwarara Flammula
Kwarara Gymnopilus
Kwarara Phaeolepiota
Kwarara Cystoderma
Kwarara Armillaria
Kwarara Tricholoma
Kwarara Clitocybe
Kwarara Collybia
Kwarara Marasmius
Kwarara Mycena
Kwarara Omphalia
Kwarara Pleurotus
Kwarara Lentinus
Kwarara Panus
Kwarara Schizophyllum
Kwarara Lenzites
Kwarara Daedalea
Kwarara Trametes
Kwarara Polyporus
Kwarara Fomes
Kwarara Ganoderma
Kwarara Polyporus
Kwarara Boletus
Kwarara Strobilomyces
Kwarara Gyroporus
Kwarara Suillus
Kwarara Fistulina
Kwarara Hydnum
Kwarara Irpex
Kwarara Radulum
Kwarara Thelephora
Kwarara Stereum
Kwarara Corticium
Kwarara Peniophora
Kwarara Exobasidium
Kwarara Tulasnella
Kwarara Sebacina
Kwarara Auricularia
Kwarara Tremella
Kwarara Dacrymyces
Kwarara Calocera
Kwarara Clavaria
Kwarara Typhula
Kwarara Pistillaria
Kwarara Sparassis
Kwarara Thelephora
Kwarara Hydnum
Kwarara Irpex
Kwarara Radulum
Kwarara Stereum
Kwarara Corticium
Kwarara Peniophora
Kwarara Exobasidium
Kwarara Tulasnella
Kwarara Sebacina
Kwarara Auricularia
Kwarara Tremella
Kwarara Dacrymyces
Kwarara Calocera
Kwarara Clavaria
Kwarara Typhula
Kwarara Pistillaria
Kwarara Sparassis

149°

RN DIVISION

U A

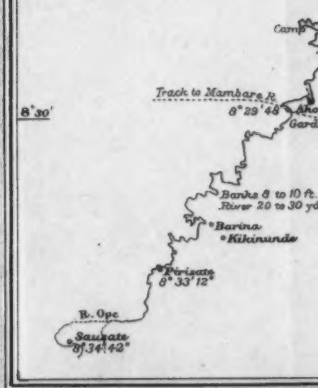
GUINEA)

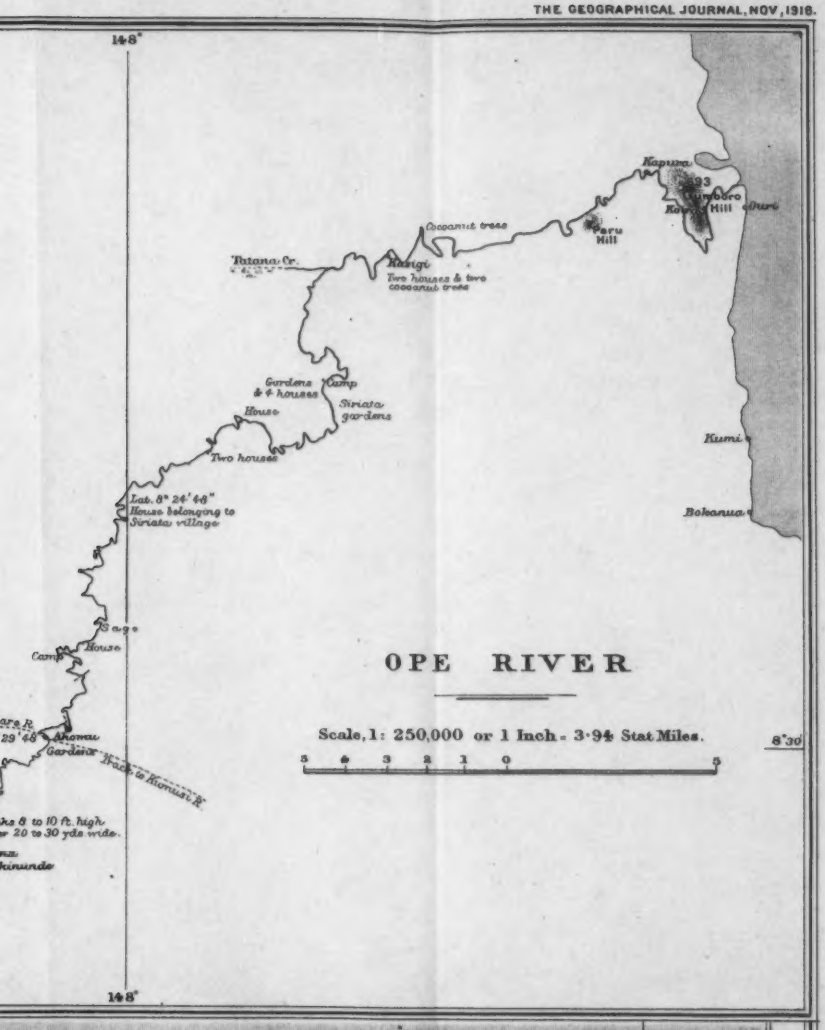
M.A., M.D.

7·89 Stat. Miles.

15 20

8°30'





OPE RIVER

Scale, 1: 250,000 or 1 Inch = 3·94 Stat Miles.

5 4 3 2 1 0 5

8°30

9°

Note.

This map depends mainly upon points fixed by intersection and resection with 3 in. and 4 in. theodolites, from positions previously determined by Sir William Macgregor, the principal of which are given in the list, supplemented by sun meridian altitudes for latitude taken with a 4 in. theodolite at the places indicated. Numerous azimuths were observed from altitudes of the sun.

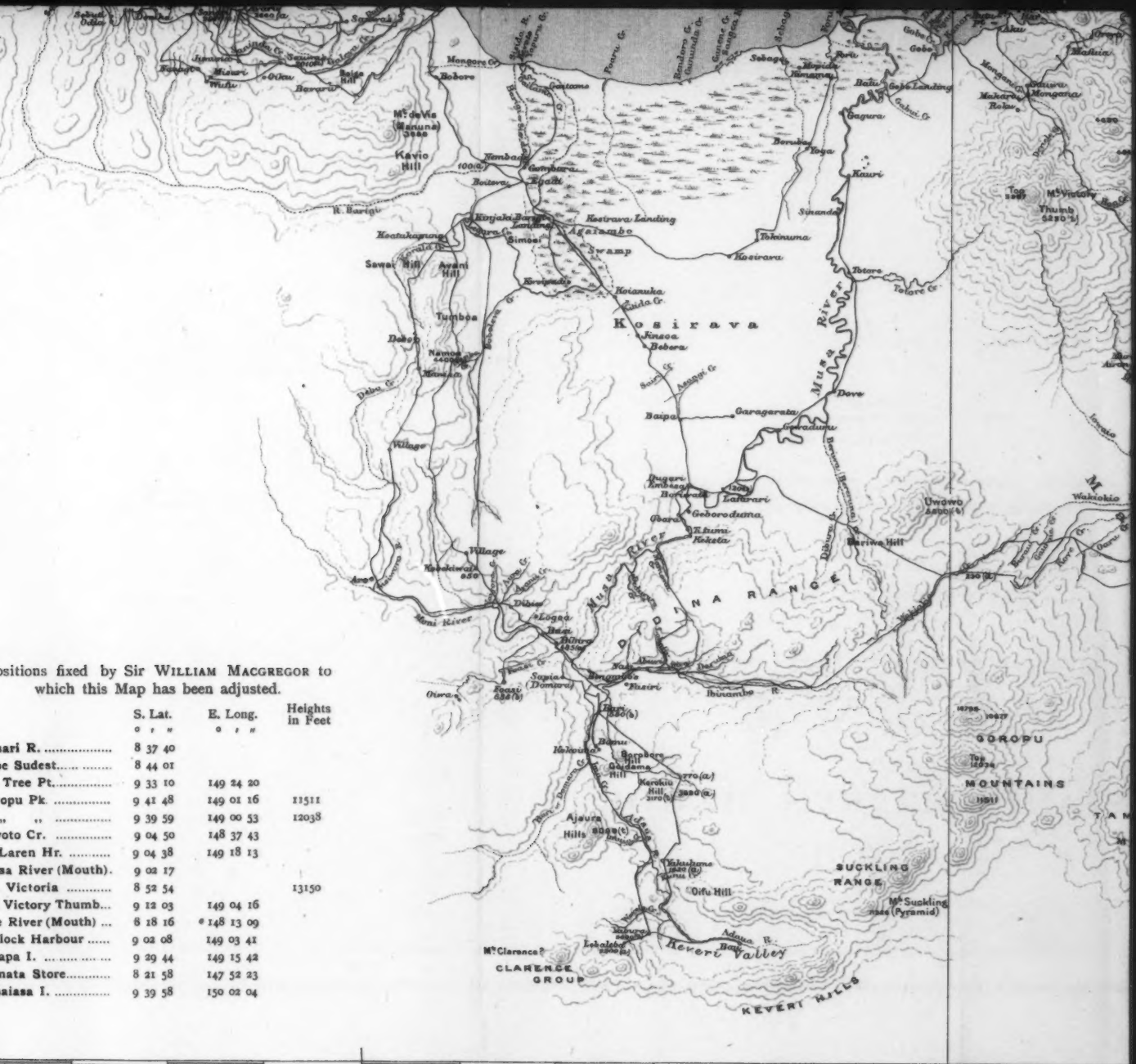
Heights marked (t) are from theodolite vertical angles, (a) from aneroid, and (b) from boiling point readings; other heights are taken from previously existing maps.

Relief is shown by form-lines which are only approximate.

In addition to the land routes shown on the map, the coast and rivers in continuous blue lines, with the exception of the upper Mambare and the lower Kumusi rivers, have been mapped from Dr. Strong's compass traverses.

Positions f
whi

Busari R. .....
Cape Sudest..
Fir Tree Pt....
Goropu Pk. ...
" " ...
Kevoto Cr. ...
McLaren Hr.
Musa River (
Mt. Victoria
Mt. Victory T
Ope River (M
Porlock Harb
Sinapa I. .....
Tomata Store
Yasaiasa I. ...



positions fixed by Sir WILLIAM MACGREGOR to which this Map has been adjusted.

	S. Lat.	E. Long.	Heights in Feet
	° ′ ″	° ′ ″	
...ari R.	8 37 40		
...e Sudest.....	8 44 01		
... Tree Pt.....	9 33 10	149 24 20	
...opu Pk.	9 41 48	149 01 16	11511
... ,, ...	9 39 59	149 00 53	12038
...oto Cr.	9 04 50	148 37 43	
...Laren Hr.	9 04 38	149 18 13	
...sa River (Mouth).	9 02 17		
... Victoria	8 52 54		13150
... Victory Thumb...	9 12 03	149 04 16	
...e River (Mouth) ...	8 18 16	148 13 09	
...lock Harbour	9 02 08	149 03 41	
...apa I.	9 29 44	149 15 42	
...nata Store.....	8 21 58	147 52 23	
...aiasa I.	9 39 58	150 02 04	

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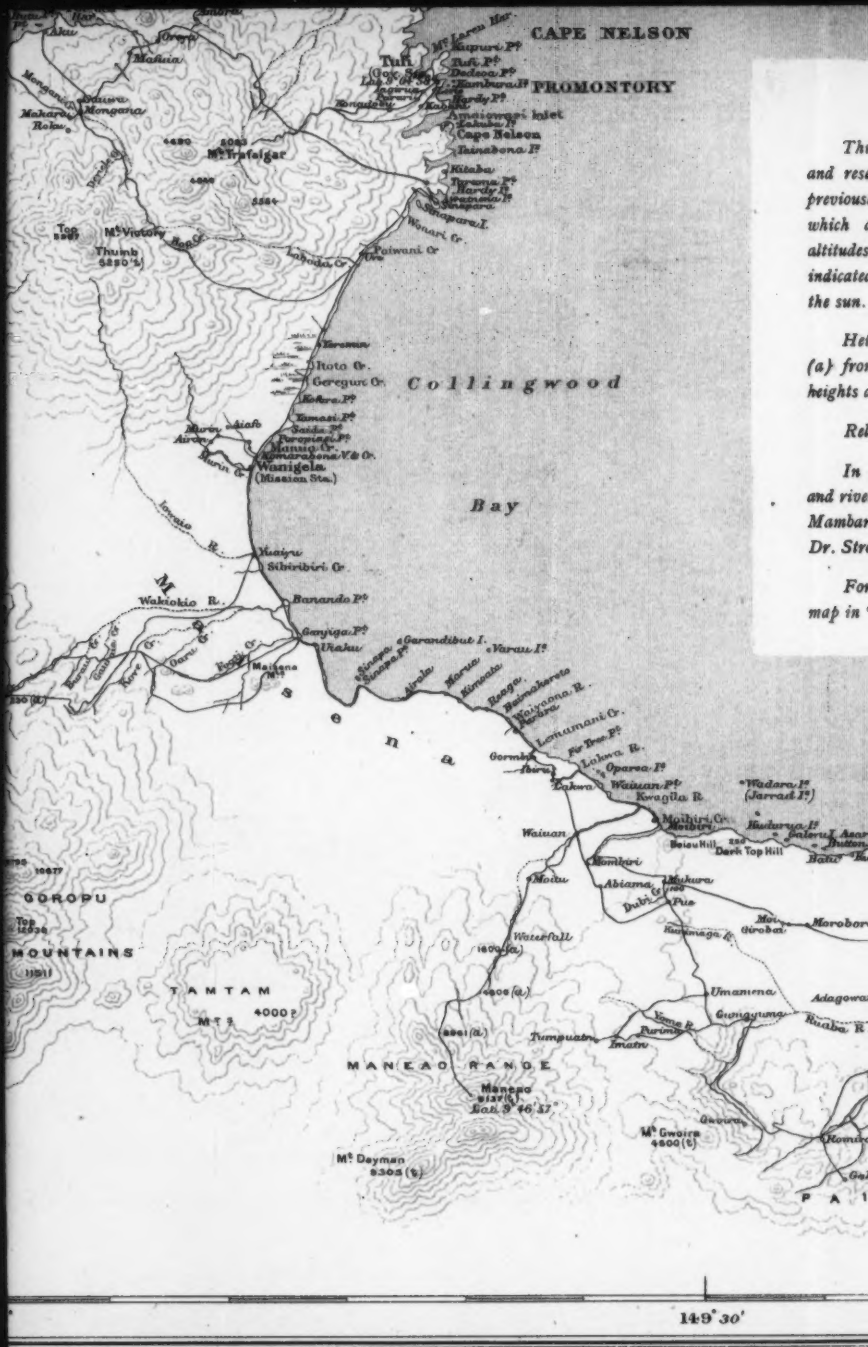
CAPE NELSON
PROMONTORY
Mt Lawes Har.
Kapuri P.t
Tuft
(206 Feet)
Ruf. P.t
Dedoa P.t
Tambaraa P.t
Hardy P.t
Amatawapi Islet
Cape Nelson
Itinabena P.t
Kitaba
Warama P.t
Hardy I.
Wanigara
Wanigara I.
Wonari Cr.
Mt Trafalgar
Mt Vinalay
Thumb
Raiwani Cr
Collingwood
Bay
Roto Cr.
Geregure Cr.
Wanigela
(Mission Sta.)
Iowaia R.
Kuaiyu
Sibiribiri Cr.
Wakiokio R.
Banando P.t
Ganyiga P.t
Vahau
Garandibut I.
Varau I.
Maitana
Lamamani Cr.
Lakwa R.
Oparea P.t
Waiuan P.t
Kwagila R.
Waiuan
Moibiri Cr.
Boiau Hill
Dark Top Hill
Moiau
Abiama
Dubi
Waterfall
Umamima
Tumpuatra
Imatru
MANEAO RANGE
Maneao
Lat. 9° 46' 37"
Mt Gwoira
Mt Deyman
GOROPU
MOUNTAINS
TAMTAM
149° 30'

Note.

This map depends mainly upon points fixed by intersection and resection with 3 in. and 4 in. theodolites, from positions previously determined by Sir William Macgregor, the principal of which are given in the list, supplemented by sun meridian altitudes for latitude taken with a 4 in. theodolite at the places indicated. Numerous azimuths were observed from altitudes of the sun.

Heights marked (t) are from theodolite vertical angles, (a) from aneroid, and (b) from boiling point readings; other heights are taken from previously existing maps.

Relief is shown by form-lines which are only approximate.

In addition to the land routes shown on the map, the coast and rivers in continuous blue lines, with the exception of the upper Mambare and the lower Kumusi rivers, have been mapped from Dr. Strong's compass traverses.

For further information see the note which accompanies this map in "The Geographical Journal" for Nov., 1916.

PAPUA
Strong.